Percon Program Generator

Version 3.5

User Manual

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Introduction

Percon Program Generator (PPG) is a Windows™ application that you can use to create individualized programs for the Percon® family of portables. Rather than requiring use of a complicated programming language, PPG provides an easy-to-follow user interface that creates the program for you. You use menu commands and dialog boxes to build a flow chart of the steps you want to include. PPG translates the flow chart into a program that can be loaded into the portable.

You can use PPG to specify

- The text that appears in the portable's display area.
- The options that can be selected with the portable's function keys.
- The types of bar codes the portable can read.
- How the portable will accept input—via the scanner (wand), the input keys, the serial port, or a combination of input sources.
- Where the portable stores data that is input.
- What to do if the wrong data or type of data is entered.
- How to format collected data for transfer to a PC file.

PPG makes it possible to customize your portable so that it suits your purposes exactly. You can use any of the sample program files that are available (see appendix D), modify an existing program, or create a program of your own from scratch.

Equipment Requirements

The following equipment is required to run PPG:

- An IBM PC or compatible computer with a 286 or better processor
- At least 1 megabyte of RAM (random access memory)
- At least 2 megabytes of hard disk space available
- A high-density, floppy disk drive (either 5¼" or 3½")
- A mouse
- DOS version 3.1 or later
- Microsoft® Windows version 3.0 or later
- A serial port (for loading your program into a portable)

You must have Microsoft Windows installed on your system. If it is not, install it following the directions in your Microsoft Windows user's guide. PPG runs only in Windows enhanced or standard mode, not in real mode.

Before You Start

Review the license agreement printed on the inside front cover of this manual and on the envelope containing the program disk. It gives you permission to copy the program files for backup purposes only. You may not make a copy for another person to use.

Also, fill out and mail the enclosed registration card. As a registered owner of the PPG program, you'll be eligible for technical support and will be notified of program upgrades.

How to Use This Manual

This manual is divided into four chapters:

- Chapter 1, "Getting Started," tells you how to install PPG on your hard disk and load it into Windows. It gives you an overview of PPG concepts and usage and describes the sample programs that come with PPG.
- Chapter 2, "Tutorial," takes you step by step through the process of building a portable program. By following the detailed instructions, you will create a simple program, use the program emulator to debug the program, and load the program into a portable. After scanning sample bar codes, you will then transfer the collected data back to your PC.
- Chapter 3, "User's Guide," gives you detailed information about using PPG. After reading through it, you can use it as a reference whenever you use PPG.
- Chapter 4, "Example Frames," offers several ideas for PPG programs you can create.

Appendixes at the end of the manual explain error messages you might encounter, give you warranty information, provide an ASCII table for reference, describe files that come with PPG, and provide several useful bar codes you can scan whenever necessary. A glossary contains definitions of technical terms used in this manual.

Ideally, you should read this manual from front to back. The tutorial will give you a good sense of what you need to do to create and use a portable program. The user's guide provides the details you need to do it. The example frames give additional helpful information. Once you've read through the manual, you may want to return to the user's guide chapter periodically to refresh your memory.

This manual assumes that you are familiar with Microsoft Windows. If you do not know how to launch applications, select menu options, or use dialog boxes, refer to your Microsoft Windows documentation.

Typographic Conventions

This manual presents special items in the text in the following ways:

- Words in *italics* are important terms you should know. Many of these terms are defined in the glossary at the back of the manual.
- Words in **bold** are selections that appear in the PPG program, such as frame names, node names, menu options, and fields and buttons in dialog boxes.
- Words in **underlined bold** are selections that you should make. These appear throughout the tutorial and in other places where you are instructed to take action.
- Words in **underlined bold** separated by an arrow (⇨) are selections that you should make in the specific order given. For example, **File**⇨**Run** means select the **File** menu and then select **Run** from that menu.
- Characters in **`courier bold`** are input characters that you should type. Input characters are usually given in lowercase (no capital letters), but you may enter them in lowercase, uppercase, or a combination. When input characters are given in uppercase or a combination of lowercase and uppercase, type the characters exactly as shown.
- Characters in SMALL CAPITAL LETTERS are file names or directories.
- Characters in **BOLD SMALL CAPITAL LETTERS** are keyboard keys, such as **ENTER**. When these are linked with a plus sign (for example, **SHIFT+ENTER**), hold down the first key while pressing the second key once.

Technical Support

If you have a question or problem that you are unable to resolve by reading the manual or online help, you can call Percon Technical Support for assistance. Before you do so, however, be prepared to offer the following information:

- Your name and address.
- The program's version number (choose **Help⇨About PPG** for this).
- The dates of the *.PHB and *.BHB files that came with PPG. (Use the File Manager or the DOS DIR command for this.)
- The versions of DOS and Windows you are using. (Type **`ver`** at the DOS prompt for the DOS version number. Choose **Help⇨About Program Manager** from the Windows Program Manager for the Windows version number.)
- The amount of RAM and extended or expanded memory installed. (If you have DOS version 4.0 or later, type **`mem`** at the DOS prompt for this.)
- The amount of free space on your hard disk. (If you have DOS version 4.0 or later, type **`dir`** at the DOS prompt for this.)
- A list of all peripherals installed, such as a serial mouse, printer, or modem.
- The contents of your CONFIG.SYS and AUTOEXEC.BAT files. (Use a Windows utility to view these, or enter **`type`** ***`filename.ext`*** at the DOS prompt in the root directory. Replace ***`filename.ext`*** with the name and extension of the file you want to read.)
- Your computer make and model.
- A concise, clear description of the problem, including any error messages that were displayed.

To contact Percon Technical Support, call 503-344-1189 between 8 a.m. and 5 p.m. Pacific time, Monday through Friday. If you prefer to correspond by letter, fax the Technical Support Department at 503-344-1399 or write to:

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Technical Support Dept.
1720 Willow Creek Circle, Suite 530
Eugene, OR 97402-9171

Chapter 1
Getting Started

This chapter helps you prepare to use Percon Program Generator (PPG). It tells you how to install the application on your hard disk and load and exit the program. It gives you an overview of the application and how it integrates with your Percon portable. Finally, it describes three sample program files that come with PPG.

Installing PPG

The PPG installation program automatically creates a subdirectory on your hard disk, copies your PPG files to it, and creates a program group for the application in Windows. To run the installation program, complete the following steps:

1. Start Windows in either enhanced or standard mode.
2. Insert the PPG program disk in drive A.

If you use a floppy drive other than A, substitute its letter for A.

3. From the Windows Program Manager, select **File**⇨**Run**.
4. In the Run dialog box, type **`a:install`** and press **ENTER** or select **OK**.

The installation program copies the PPG files to a subdirectory named \PPG31 off the root directory of your hard disk. You can specify another directory during the installation, but it must be immediately off the root directory (for example, \MYPPG). also creates a new program group in your Windows Program Manager. The Percon PPG31 program group contains the following items:

PPG is the Percon Program Generator application. This is the application you'll use to create programs for your Percon portable.

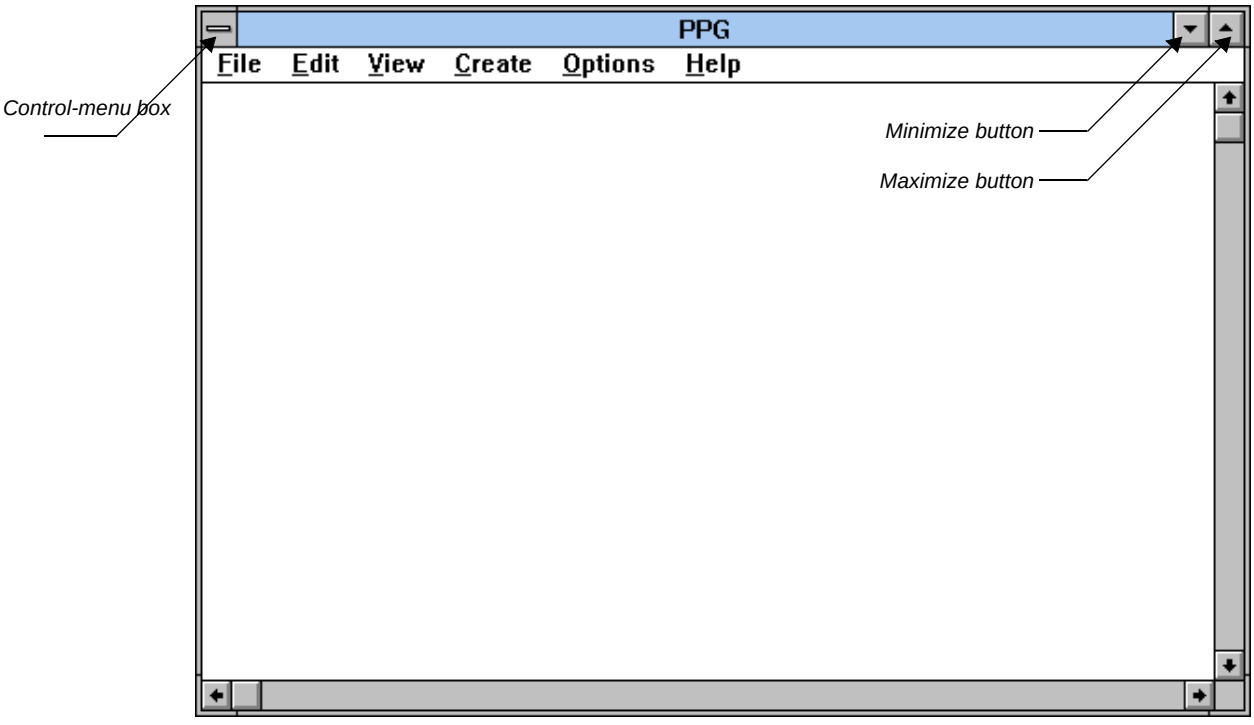
PROG is used to transfer the program you created in PPG to the portable. This utility is called automatically by PPG when you download a program to the portable.

PTFER is used to transfer data between a PC and the portable. After you've scanned bar codes with the portable, you can use this utility to upload the data into a file on your PC. You can also use it to download information stored in a PC file into the portable.

Loading and Exiting PPG

To work with PPG, select the PPG icon in the Percon PPG31 program group in Windows. The PPG window appears, as shown in figure 1-1.

Figure 1-1. The PPG window



You can use the Windows “drag-and-drop” technique to load PPG and a program source file at the same time. Just use the mouse to drag the icon for the file from the Windows File Manager onto the PPG icon.

To expand the window to fill the screen, select the **Maximize button** (see figure 1-1).

To temporarily remove the PPG window from your screen without exiting the application, select the **Minimize button** (see figure 1-1). The window becomes an application icon at the bottom of the Windows desktop. Double-click on the icon to bring the window back exactly as you left it.

To exit PPG, select **File⇨Exit** from the menu or double-click on the **Control-menu box** (see figure 1-1). A dialog box appears, asking if you want to save any changes to the current file. Select **Yes** to save changes or **No** to discard them.

For further information on working in application windows, including using scroll bars and selecting menu commands, refer to your Windows documentation.

An Overview

PPG helps you program your Percon portable to collect and store data in exactly the way you want. Creating the program is only one part of the process, however. There are actually several steps involved:

Generating the Program This involves using PPG to create a flow chart of the data-collection process. Details of each step in the program are given in dialog boxes attached to individual pieces of the flow chart.

Emulating the Program This is an optional step, but it can be helpful in testing a new program. It uses a special Emulation window that simulates the effects of a program as you run it. You can see text displayed on a model portable screen, simulate data input, and “press” function keys. You can also view the contents of specified registers, set breakpoints at which to pause program execution, and view a “Trace” window that lists actions taken. If there are problems with the program, you can correct them before you load the program into your portable.

Downloading the Program Once your program is complete, you can connect your Percon portable to your PC via a supplied cable and use the **Download Program** command to load the program into it. PPG compiles the program first, translating it into code that is understood by the portable, and then sends the program over the cable to the portable. When it's done, you're ready to collect data using the portable.

Transferring Data After you've scanned a series of bar codes with the programmed portable, you can use the PTFER or PDTFER program that comes with PPG to transfer the collected data to a file on your PC. The information is sent back through the connected cable to a specified file on your computer. You can also transfer data, such as a "pick list" for comparing input data, from the PC to the portable. Versions of this transfer program are also available for Macintosh and UNIX computer systems (see chapter 4).

Most likely, the data you collect and store in a file will be nothing more than a series of numbers or alphanumeric strings. You can transfer that data, however, into a data processing program that makes sense of it. For example, a scanned bar code may read 107-028-0274. However, once that number is fed through a database or some other program set up to interpret it, it could be translated into more readable information, such as DECKERS THONG-ADULT, BLACK BRAID, $25.60.

Although it is possible to program the portable to translate scanned numbers into words, this is usually a function of the program you use to process the data. You may load the data into a spreadsheet program, for example, that you can use to perform calculations. Or you might use a database program that keeps track of each item in your inventory. You can use PPG to format collected data in a style that is accepted by most data processing programs.

Sample Program Files

PPG comes with three important sample files:

- SAMPLE.SCR allows you to collect information with your portable, upload collected data to a PC, and erase collected data. You will be using this file as you work through chapter 2.
- SAMPLE2.SCR is a simple but complete data-collection program that allows the user to enter data as either item-and-quantity values or just item values. The program also stores data, uploads data, and erases data.
- SAMPLE3.SCR is an expanded version of SAMPLE2.SCR that includes review and edit capabilities. (This is the program that was loaded with your portable when you first got it.)

You can use these files as is or modify them to suit your needs.

Several additional sample files are available from your PPG dealer (see appendix D). Some of these files are just portions of programs demonstrating use of a specific node. However, you can use any of these samples as a foundation for building a full-size program.

Chapter 2
Tutorial

This chapter eases you into using Percon Program Generator (PPG) by stepping you through several specific procedures. Detailed instructions have you perform the following:

- View the flow chart of a sample program file.
- Load the program into your portable, collect data using the program, and upload the data to your PC.
- Build a portable program of your own using PPG. The program will allow you to collect and upload data using your portable.
- Use the Emulation window to debug your portable program.
- Load the new program into your portable and use it to scan bar codes.
- Upload the collected bar code data to a file on your PC.
- Create a template that divides a register into fields so that different types of values (quantity and item) can be stored together as value pairs.

The entire tutorial should take approximately two hours to complete. Optional breaks are inserted between sections, with instructions on saving and reloading your work. If you can't complete the tutorial in one sitting, it's best if you stop at one of these points.

When you're done, you should have a solid understanding of the steps involved in programming and uploading data from the portable. You can then refer to chapter 3 for details on creating your own customized portable program.

Studying a Sample Program

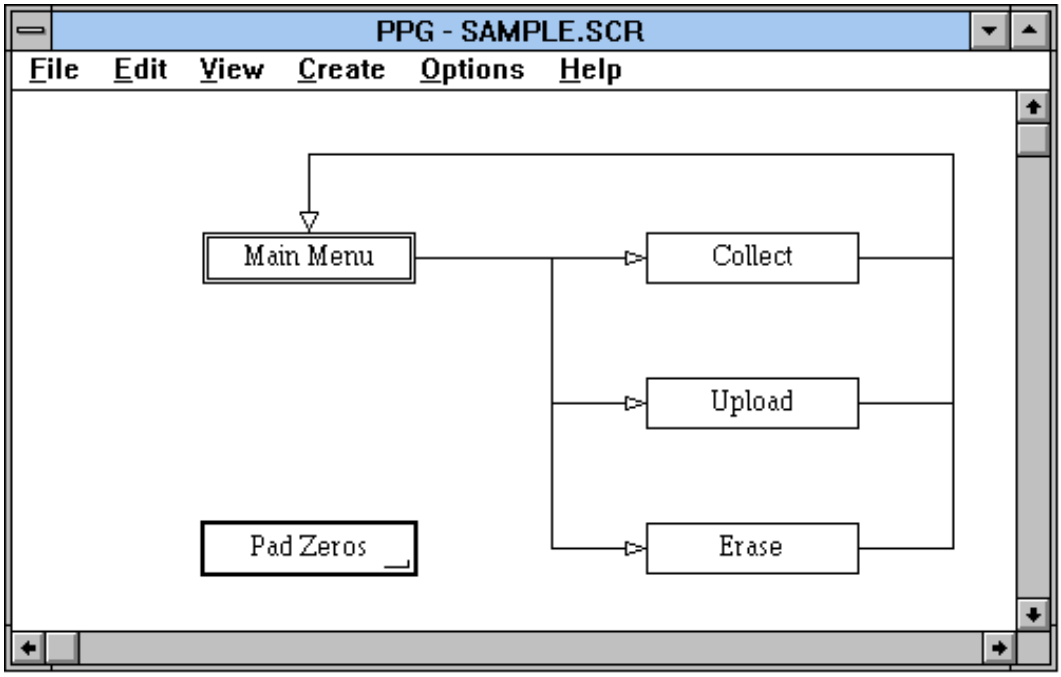
The easiest way to find out how a portable program works is to study an existing one. PPG comes with three sample program files. We will take a look at the simplest of the three. Later, you will load it into your portable and collect and upload data with it.

Complete the following steps to see how a sample program works:

1. If you're not already in PPG, start it now by going into the Percon PPG31 program group in Windows and double-clicking on the **PPG icon**.

2. Click on the **Maximize button** at the right end of the title bar to expand the PPG window to a full screen.
3. Choose **File**⇨**Open** and select **sample.scr** from the displayed list of files in the C:\PPG31 directory. Select **OK** to load the file into the PPG window (see figure 2-1).

Figure 2-1. A sample program file

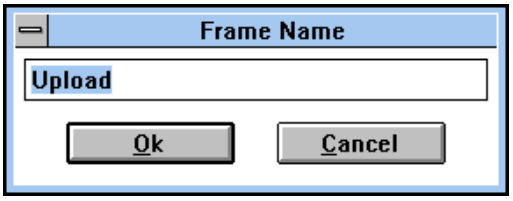


The program is initially shown at what is called the *Frames level*. This level contains a flow chart of the program's main functions. Each rectangle in the chart is called a *frame*. Most of the frames are linked together with arrows, indicating the flow of the program. This sample program includes a Main Menu that branches off into three tasks: collecting data, uploading data, and erasing data. Each of the tasks also allows you to return to the Main Menu.

The rectangle labeled “Pad Zeros” in the bottom-left corner is a *subroutine*. It doesn’t link directly to the other frames, but it is jumped to from other parts of the program by *Call nodes*.

4. Move the mouse pointer to the **Upload** frame and click the **right mouse button** (or select the frame and choose **Edit**⇨**Rename** from the menu). The Frame Name dialog box will appear (see figure 2-2). This is where you define the text displayed in the frame.

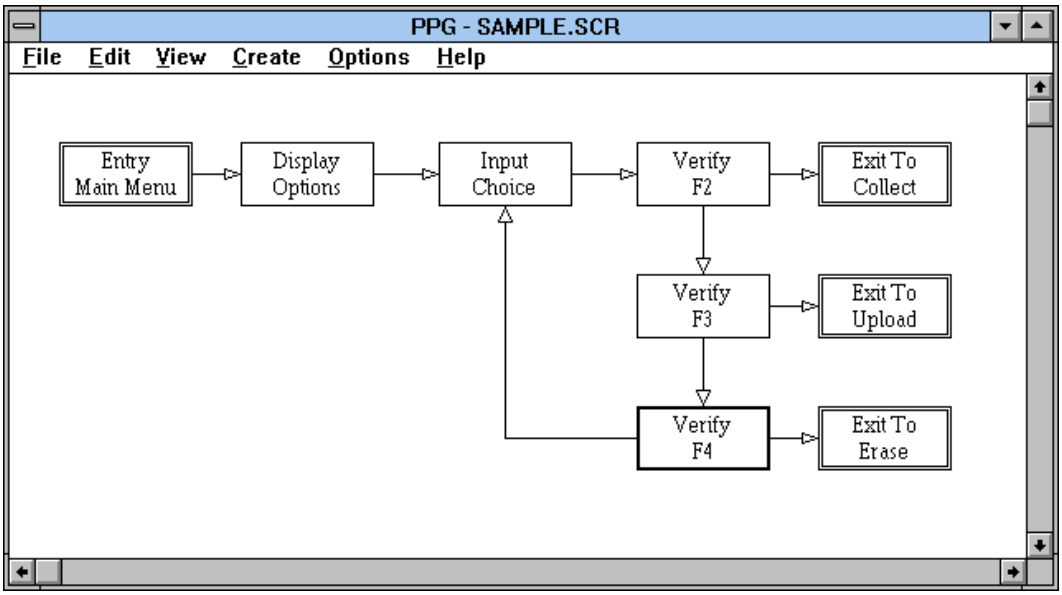
Figure 2-2. The Frame Name dialog box



You can also move to a frame by pressing the **TAB** key. The current frame is always indicated by a thick border. To select a frame, double-click on it with the **left mouse button**, or move to it and then press the **SPACEBAR**.

5. Select **Cancel** or press **ESC** to close the dialog box.
6. Each program frame has its own sublevel flow chart, stored at the *Nodes level*. This enables you to break down a program into workable pieces, rather than dealing with one giant flow chart. Select the **Main Menu** frame to view its flow chart in the Nodes level (see figure 2-3).

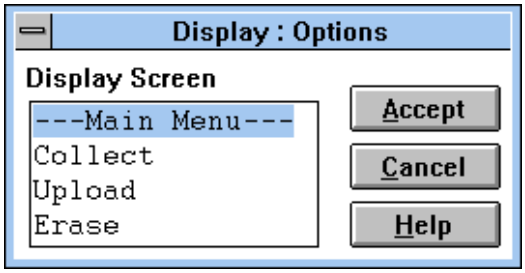
Figure 2-3. The Nodes level of the Main Menu frame



At the Nodes level, each rectangle in a flow chart is called a *node*. Nodes give the program detailed instructions, such as where to store scanned data. A *Menu node* presents a menu of options on the portable's screen and specifies what actions will occur when the user presses function keys associated with those options. You specify these instructions by setting options in dialog boxes attached to the nodes.

7. Select the **Display : Options** node to view its dialog box (see figure 2-4).

Figure 2-4. The Display : Options dialog box

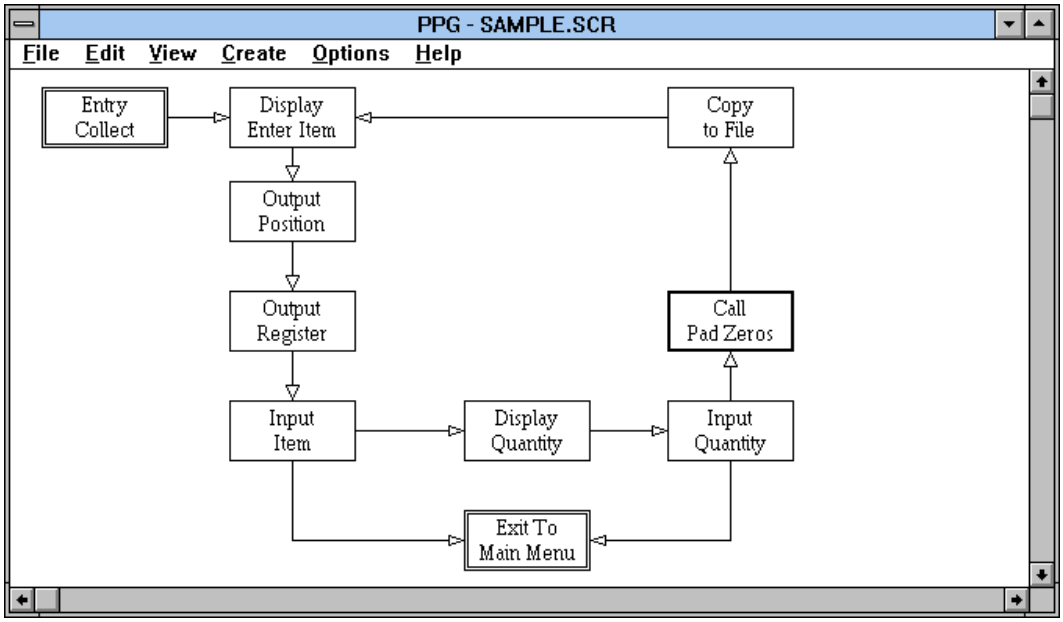


8. Select **Cancel** or press **ESC** to exit the dialog box.
9. Select the **Entry : Main Menu** node (or any of the Exit To nodes) to return to the Frames level of the program. (Entry and Exit nodes have double-line borders.)

You can also use **View⇨Frames** and **View⇨Nodes** in the menu to jump between levels.

10. Select the **Collect** frame to view its Nodes level (see figure 2-5).

Figure 2-5. The Nodes level of the Collect frame

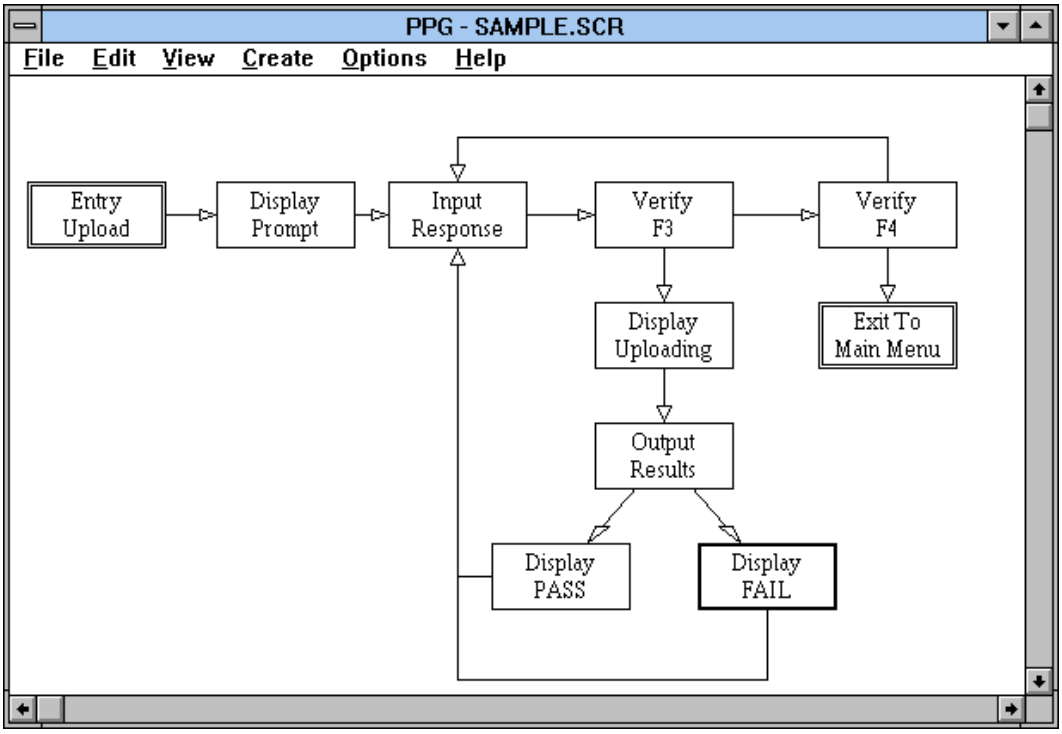


Two Display nodes prompt the user to scan or enter first an item code (**Display : Enter Item**) and then a quantity value (**Display : Quantity**). Both entered values are displayed together on the screen (via the Output nodes) and are then copied to a file for storage (via the Copy node).

The Input nodes send control back to the Main Menu if a function key is pressed. The Call node jumps to the **Pad Zeros** subroutine back in the Frames level, padding the input value with zeros, if necessary, to meet a required number of digits.

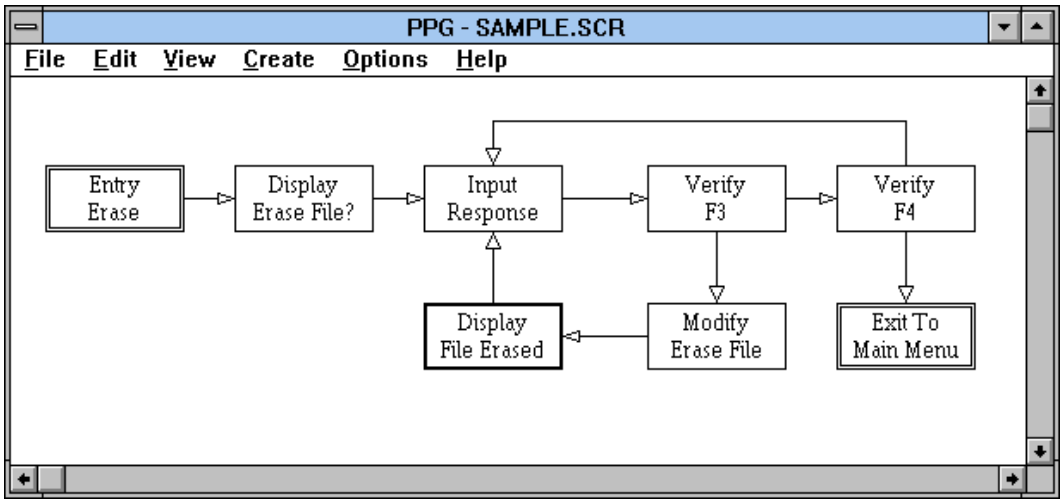
11. Select either the **Entry : Collect** or **Exit To : Main Menu** node to go back to the Frames level.
12. Select the **Upload** frame to view the nodes involved in uploading collected data (see figure 2-6).

Figure 2-6. The Nodes level of the Upload frame



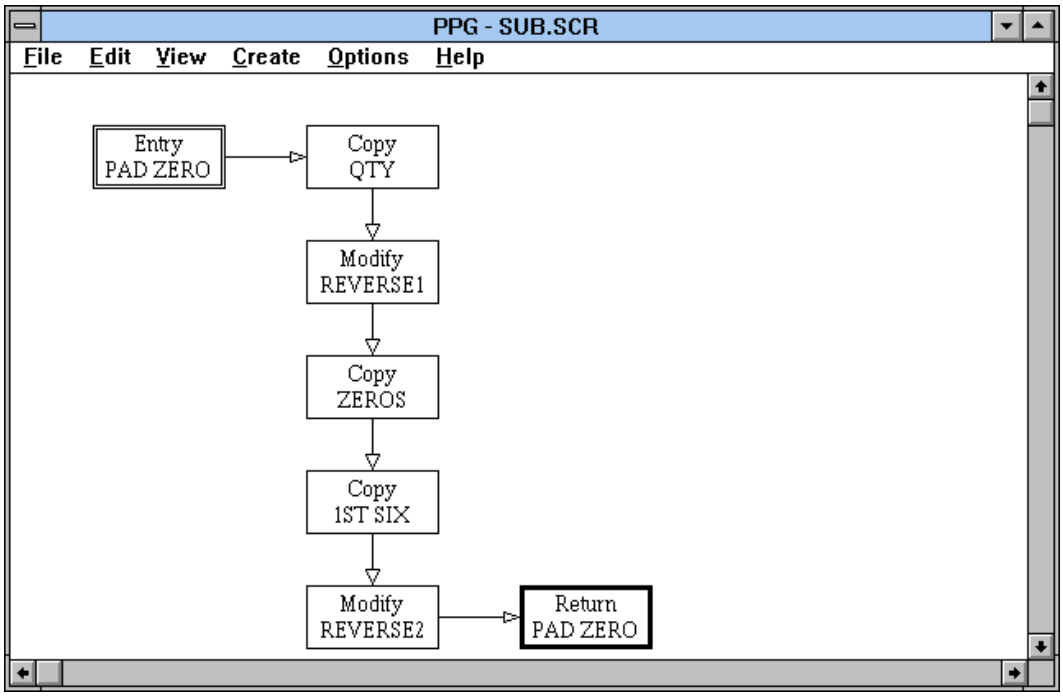
13. Select either the **Entry : Upload** or **Exit To : Main Menu** node to go back to the Frames level.
14. Select the **Erase** frame to view the nodes involved in it (see figure 2-7).

Figure 2-7. The Nodes level of the Erase frame



15. Select the **Exit To : Main Menu** node to return to the Frames level of the program.
16. The **Pad Zeros** subroutine (back in the Frames level) is called from within the **Collect** frame. It adds zeros to the front of a value to make it contain a given number of digits. Select the subroutine box to display its nodes (see figure 2-8).

Figure 2-8. The Nodes level of the Pad Zeros subroutine



17. Select **Return : Pad Zeros** to return to the Frames level.

By looking at all the pieces of this program file, you can get a general idea of how the program is put together. The Frames flow chart defines the major tasks of the program: **Main Menu**, **Collect**, **Upload**, **Erase**, and **Pad Zeros**. Each frame and the subroutine is associated with a more detailed flow chart at the Nodes level. Together, the frames, subroutine, and nodes work to outline every detail of the data-collection process.

Want a Break? If you're ready for a break, you can easily stop here. You haven't made any changes that need saving, so you won't lose any work if you exit PPG or turn off your computer.

Programming Your Portable

To use the program with your portable, you must download it from PPG to the portable. Complete the following steps:

PPG

1. If you're returning from a break and had exited PPG, start the program now by double-clicking its icon in the Window's Percon PPG31 program group.
2. Connect the 25-pin connector of your cable supplied with your portable to a serial port on your computer. (If you have a 9-pin serial port, use a 25-to-9-pin adapter.)
3. Connect the other end of the cable to your portable.
4. Turn the portable on.
5. In the PPG window, select **File⇨Download Program** from the menu. If a dialog box appears asking whether you want to save changes to the file, select **Cancel** to keep the sample file intact. (This will abort the download. Close the sample file without saving it, reopen it, and select **File⇨Download Program** again.) If you do not have the sample file loaded, select it from the dialog box that appears.

   The Percon Portable Compiler window appears momentarily as PPG compiles the program, translating it into a language understood by the portable.

While a program is downloading, you can work in another application window.

When compiling is complete, the Percon Portable Programmer window appears, displaying the message “Initiating Download.” If the connection is successful, the window shows further messages as the program is loaded into the portable. The percentage of completion is displayed as the programming progresses.

When downloading is complete, the portable will beep. You'll see the message “Portable successfully programmed” in the Percon Portable Programmer window, and the program's Main Menu will appear in the portable’s display.

6. Double-click on the Percon Portable Programmer window's **Control-menu box** or select **File**⇨**Exit** from the menu to close the window. (If downloading was unsuccessful, select **Abort** from the menu bar first.)
7. Double-click on the Percon Portable Compiler window's **Control-menu box** to close it.

If You Have Problems

If the message “Timeout Exceeded” appears or nothing happens at all, PPG was unable to make the connection with the portable. It may be that your serial port is not COM2. Click on the **Comm** command in the Percon Portable Programmer menu bar until it reflects the number of your COM (communication) port. Then select the **Download Program** command again. (The COM setting is automatically stored with PPG and used the next time you download a program.)

Also, make sure that the cable is firmly connected at both ends. You might try resetting the portable by pressing **SHIFT+ENTER** (**ALPHA+ENTER** on the PT 2000) while you reinsert the battery.

Depending on the program currently loaded into the portable, you may need to scan the following bar code or select options in the portable to place it in a mode for accepting downloaded data.

Uploading Bar Code Data

Try testing out the newly loaded program by scanning the bar codes that follow. (Remove the cable first, if you wish.) First press the **F2** (**Collect**) button to prepare the portable to accept data. After each code you scan, enter a quantity value by pressing a number key, and then press **enter**.

Now upload the collected data to your computer by completing the following steps:

1. Click on the **Minimize button** in the PPG window to put it out of sight temporarily.
2. Back in the Windows Program Manager, double-click on the **PTFER** icon in the Percon PPG31 program group. A blank PTFER window opens with three menu options: **File**, **Options**, and **Help**.
3. If your serial port is not COM2, select **Options**⇨**Settings** from the menu, select the correct COM port, and select **Ok**. (The setting is automatically stored with the PTFER program and is used the next time you transfer a file.)
4. Select **Options**⇨**Connect** to connect the program with the selected COM port. A message appears in the window, saying the connection was successful. (If you don't see this message, check the COM port setting. Make sure no other device is using the COM port you specify, and try again.)
5. Select **File**⇨**Receive**. In the Receive File dialog box, type **`data`**. This specifies a new file named DATA, with the default extension of .TXT, as the destination for the uploaded data. By default, the file is stored in the C:\PERCON\LIB directory, but you can always specify a different directory.
6. Select **OK** to return to the PTFER window. The name of the Receive file, DATA.TXT, should appear in the title bar.
7. If you disconnected the portable from the cable, reconnect it now.
8. Press **F4** on the portable to return to the Main Menu, and then press **F3** (for **Upload**) to prepare the portable for uploading data.
9. At the portable's prompt for uploading data, press **F3** (for **Yes**) to begin uploading.
10. The alphanumeric translations of the bar codes you scanned are stored in the file named DATA.TXT, and the message "File Received" appears in the PTFER window.
11. Select **File**⇨**Exit** to close the PTFER utility.

Once you've uploaded a file from the portable, you can put it to use with whatever application you use to work with scanned data. For example, you might have an application that translates the numbers and letters in the bar codes into meaningful text.

Want a Break? If you're ready for a break, you can easily stop here. You haven't made any changes that need saving, so you won't lose any work if you exit PPG or turn off your computer.

Building Your Own Portable Program

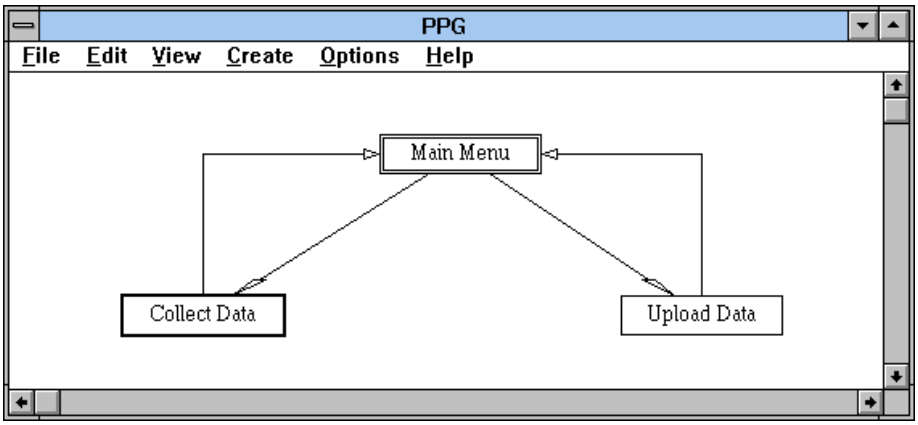
At this point, you should understand the general concepts behind creating and loading a portable program, although many of the details have yet to be explained. In this section, you'll create a simple portable program from scratch. It will allow you to collect data with the portable and upload it to your PC. A menu that appears when you turn on the portable gives you a choice of the two possible actions.

Creating Frames and Links

A program's *frames* define its general functions, such as collecting and uploading data. *Links* connecting frames indicate program flow—how you move from frame to frame. The details for the program are contained in the *Nodes level* for each frame.

For your program, you will create three frames: **Main Menu**, **Collect Data**, and **Upload Data** (see figure 2-9.). The program will start with the **Main Menu** frame, which offers access to the other frames. You can return to the Main Menu from either action frame.

Figure 2-9. The Frames level of the program



Create the frames shown in figure 2-9 by completing the following steps:

1. To continue from the last section, double-click on the **PPG icon** at the bottom of the Windows desktop. If you took a break and exited PPG, restart the program now by double-clicking on its icon in the Window's Percon PPG31 program group. Click on the **Maximize button**, if necessary, to expand the window to fill the screen.
2. Select **File**⇨**New** to clear the workspace area so that you can create a new flow chart. (If prompted, answer **No** to saving changes.)

3. Select **Create**⇨**Frame** to draw the first frame. The cursor turns into a rounded box labeled “FRAME”. Move it to the top-middle area of the workspace, and click the **left mouse button**. A rectangle labeled “Frame1” appears at the cursor.

To adjust the position of a frame, just drag it with the mouse. To delete an unwanted frame or node, select it and then press **DELETE**.

4. Click the **right mouse button** (or select the frame and choose **Edit**⇨**Rename** from the menu) to display the Frame Name dialog box. Type **`Main Menu`** in the input box, and press **ENTER** or select **Ok**. The frame now appears with the name "Main Menu."
5. Now create the **Collect Data** frame. Select **Create**⇨**Frame**, move the FRAME box to the bottom left area of the workspace, and click the **left mouse button**. Open the Frame Name dialog box, type **`Collect Data`**, and select **Ok**.
6. Select **Create**⇨**Frame**, move the FRAME box to the bottom right area of the workspace, and click the **left mouse button**. Open the Frame Name dialog box, type **`Upload Data`**, and select **Ok**.

You now have the three frames of your program. Next, you need to create the arrows, or links, showing the flow of the program between the frames. Complete the following steps:

1. Select **Create**⇨**Link**. The cursor turns into a rounded box labeled "LINK".
2. Move the LINK box to the **Main Menu** frame and click the **left mouse button**.
3. Move the LINK box to the **Collect Data** frame and click the mouse again. An arrow appears, pointing from the **Main Menu** frame to the **Collect Data** frame.
4. Choose **Create**⇨**Link**, click on the **Main Menu** frame, and then click on the **Upload Data** frame. A second arrow appears.

The links you created give the user access to either the **Collect Data** or **Upload Data** frame from within the Main Menu.

To adjust a link, exit Create mode and use the mouse to drag the link's arrowhead. To delete a link, drag its arrowhead to a blank area and double-click the left mouse button.

From each of the action frames, you want to give the user access to the Main Menu. You need to create links back to the **Main Menu** frame. This time you'll create jointed links that bend at a 90˚ angle. Complete the following steps:

1. Select **Create**⇨**Link** and click on the **Collect Data** frame.
2. Instead of clicking directly on the other frame, move the LINK box straight up until it is level with the **Main Menu** frame, and then click the **left mouse button**.
3. Now move the pointer to the **Main Menu** frame and click the **left mouse button**. A jointed line appears.

Jointed links work just like straight links, but they give you more flexibility in their placement. If a jointed link appears jagged, drag its joint until its lines are perpendicular.

4. Use the same method to create a jointed link from the **Upload Data** frame to the **Main Menu** frame.

Your screen should now look like the one shown in figure 2-9.

To redraw the screen and erase any extraneous lines, click in any blank area of the flow chart.

Creating the Main Menu Nodes

Once you've defined the frames of a program, you use the Nodes level to specify the detailed parts of each frame. Each frame has its own set of nodes.

To go into the Nodes level of a frame, just double-click on it. You can also move to the frame with the **TAB** key and then either select **View⇨Nodes** from the menu or press the **SPACEBAR**.

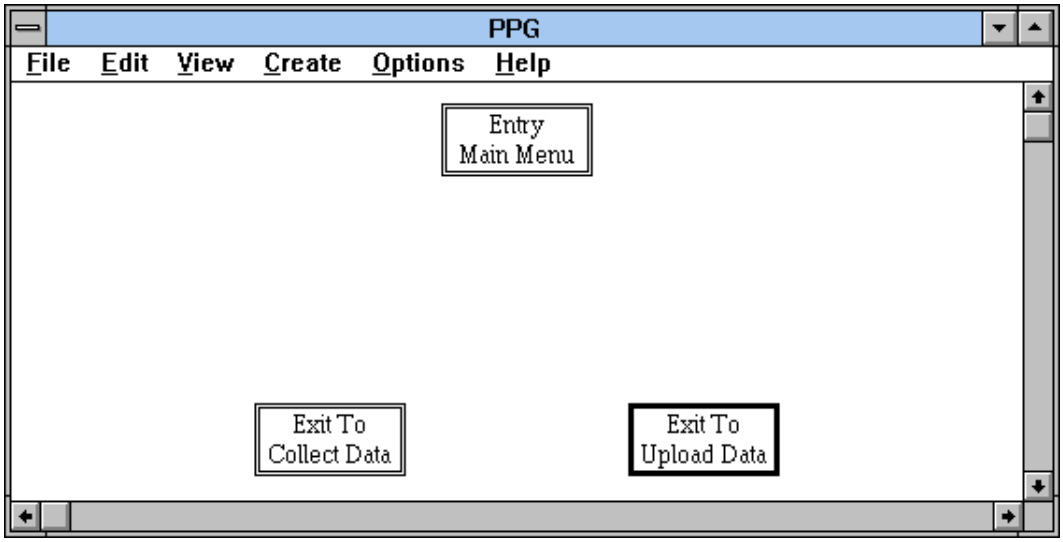
Because nodes involve much more detailed information than frames, they are divided into nine types, with a different dialog box associated with each type. For example, a Display node specifies text to display on the portable's screen; that text is entered into a dialog box attached to the node.

In this section, you'll set up the nodes for the **Main Menu** frame. This is a very uncomplicated frame, simply creating a path to either of the other two frames. You will create a Menu node that advances to the **Collect Data** frame if the user presses **F3** and to the **Upload Data** frame if the user presses **F4**.

Set up the nodes for the **Main Menu** frame by completing the following steps:

1. Select the **Main Menu** frame. The workspace changes to show three double-lined boxes: **Entry : Main Menu**, **Exit To : Collect Data**, and **Exit To : Upload Data**. These nodes are created automatically by the links you set up at the Frames level. They offer entry to and exit from the Main Menu nodes.
2. Reposition the existing nodes as shown in figure 2-10.

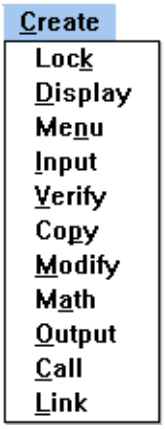
Figure 2-10. Repositioned nodes



To move a node, just move the mouse pointer to the node, hold down the left mouse button, and drag the node with the mouse.

3. Select **Create** from the menu bar. Notice that the **Create** menu has changed. In place of **Frame** and **Subroutine**, the nine types of nodes are listed (see figure 2-11).

Figure 2-11. The Create menu at the Nodes level

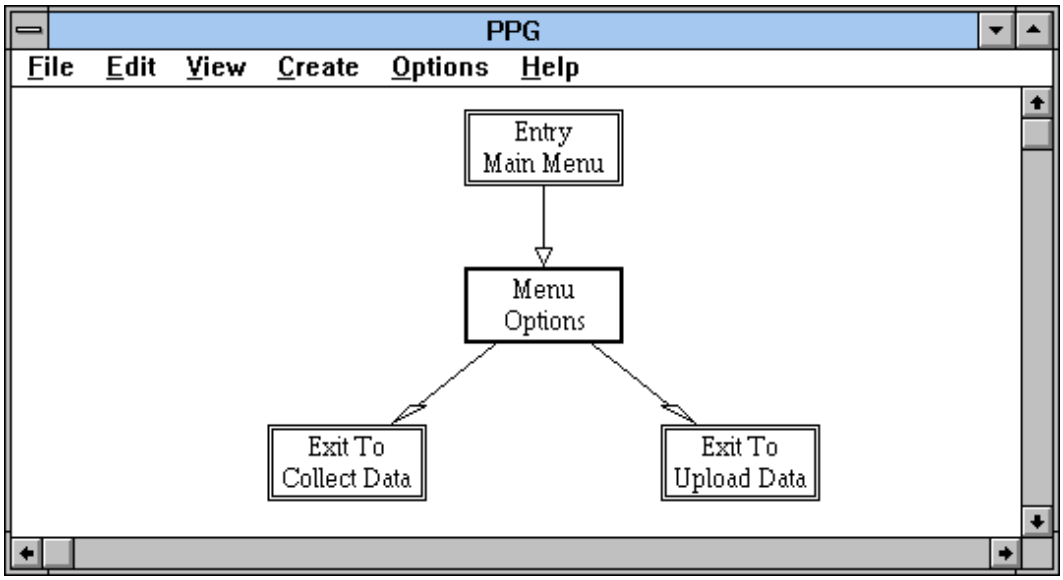


4. Select **Menu**. The pointer changes to a rounded box labeled “Menu”.
5. Click below the **Entry : Main Menu** node to create a Menu node there.
6. Change the node’s name to **Options**.

Changing a node’s name is identical to changing a frame’s name. (See step 4 on page 11 if you don’t remember how to change a frame’s name.) Notice that only the second line of text on the node is changed. The first line always identifies the node's type.

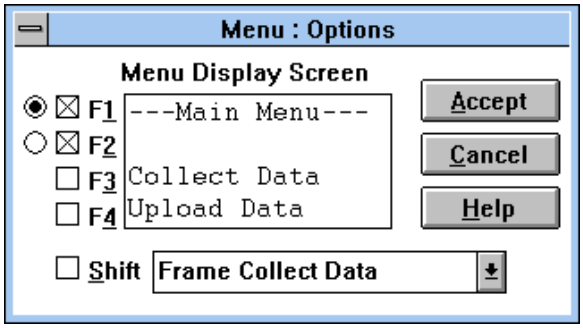
7. Now you need to link the nodes together to indicate program flow. Select **Create**⇨**Link**, and then select **Create**⇨**Lock**. This locks PPG into Create Link mode so that you don't have to keep choosing **Create**⇨**Link** over and over.
8. Use the mouse to draw the links shown in figure 2-12. When you're done, choose **Create**⇨**Unlock** or press **ESC** to exit Create Link mode.

Figure 2-12. The completed Main Menu nodes



9. Select the **Menu : Options** node to bring up the dialog box for it. The dialog box includes a text-entry area that is 16 characters wide and 4 lines deep, exactly the size of the portable's screen (see figure 2-13).

Figure 2-13. The Menu : Options dialog box

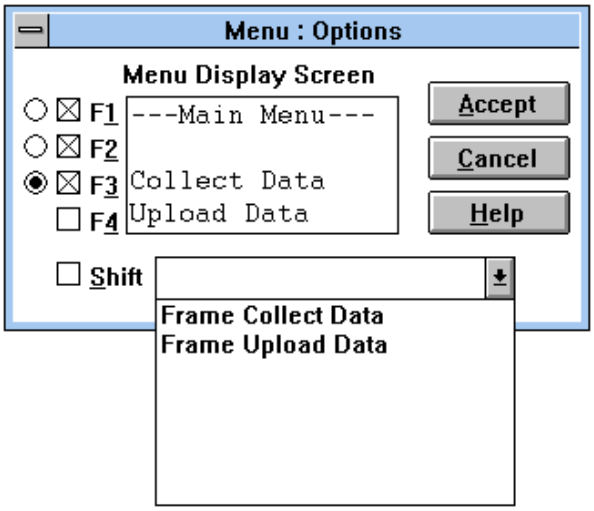


10. On the first line, type **`---Main Menu---`**.
11. Press **ENTER** twice to jump to the third line, and type **`Collect Data`**.
12. Press **ENTER** again and type **`Upload Data`** on the last line, as shown in figure 2-13.

    To the left of the text-entry area are check boxes for function keys used to select options presented on the portable's screen. The menu options you've created are lined up with function keys **F3** and **F4** on the PocketReader. To initiate proper actions for these keys, you need to specify which node to progress to for each.

13. Select the **F3** check box. A radio button appears next to the check box to show that this is the active control. Click on the **down-arrow button** next to the input box at the bottom of the dialog box. A drop-down list appears, listing each node that this one is linked to (see figure 2-14).

Figure 2-14. The drop-down list for Menu : Options



14. Select **Frame Collect Data** so that when the user presses **F3**, the program will progress to the **Collect Data** frame.

15. Select the **F4** check box. A new selected radio button appears. Click on the **down-arrow button** next to the nodes input box, and select **Frame Upload Data** from the displayed list. This moves the program to the **Upload Data** frame when the user presses **F4**.

16. Select **Accept** to exit the dialog box, and select an entry or exit node to return to the Frames level of the program.

Saving Your Program

Even though the program's not complete, it's a good idea to save it periodically as you build it, for safety's sake. Select **File**⇨**Save** to save the program in a file. Enter **`tutorial`** in the **File Name** input box of the displayed dialog box, and select **OK**. PPG will add the extension .SCR automatically.

You have now completed the nodes of the **Main Menu** frame. These nodes display two options on the portable's screen and allow the user to indicate a choice by pressing **F3** or **F4**. The program then checks to see which function key was pressed and passes control to either the **Collect Data** or **Upload Data** frame accordingly.

Want a Break? If you're ready for a break, you can easily stop here. Since you just saved your program in a file, you won't lose any work if you exit PPG or turn off your computer.

Creating and Setting Up the Collect Data Nodes

The Collect Data frame allows the user to scan bar codes and enter data through the keys of the portable. That data is temporarily stored in a register and then copied into a file, which can be uploaded later to a PC.

You'll set up data-collection nodes to do the following:

- Display a message on the portable's screen telling the user that the portable is ready to accept data.
- Allow data input from the wand (scanner) or the portable's keys, specify how to handle each type of input, and name a register in which to store the data temporarily.
- Verify that the user input is valid and, if it is not, display an error message and sound a beep.
- Copy the data from the temporary register to a data file and redisplay the initial message asking for input.

In addition, you'll create an option that will allow the user to return to the Main Menu by pressing a function key.

Create nodes for the **Collect Data** frame by completing the following steps:

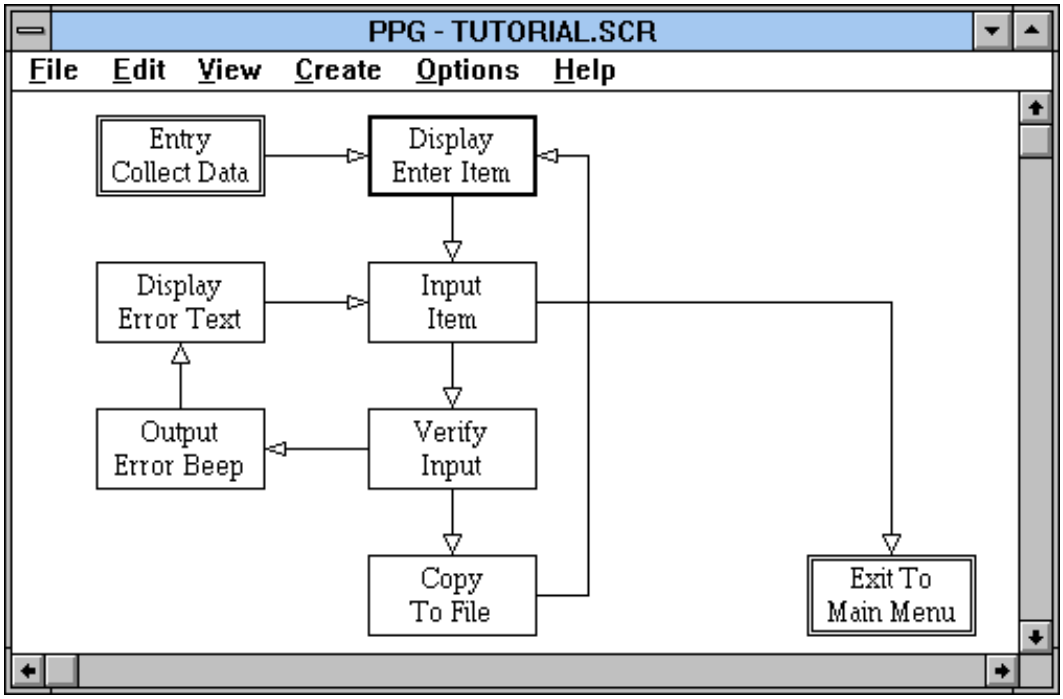
1. If you're returning from a break after exiting PPG, double-click on the PPG icon in the Percon PPG31 program group. Then choose **File**⇨**Open** and select **`tutorial.scr`** from the file list. Select **OK** to load the file into the PPG window.
2. At the Frames level, select the **Collect Data** frame to access its Nodes level. Because this frame has two links (one to it and one from it), there are two nodes initially created: **Entry : Collect Data** and **Exit To : Main Menu**. Reposition these nodes so that the Entry node is in the upper left corner and the Exit node is at the bottom right.

If you click twice on either of these nodes, you'll end up back in the Frames level.

3. Create all the nodes shown in figure 2-15, using commands on the **Create** menu. Each node's type is indicated by the first line of text in the node. Rename each node according to the second line of text. Link the nodes together as shown.

When linking the **Verify : Input** node, create the link to the **Output : Error Beep** node first. This actually creates two links (a requirement for verify nodes), one on top of the other. If you try to create another link, the program won't let you. Instead, place the mouse pointer over the arrow of the top link, press and hold down the **left mouse button**, and drag the link to the **Copy To : File** node. Then release the mouse button and click it once to set the link. The underlying link (from the Verify node to the Output node) stays in place.

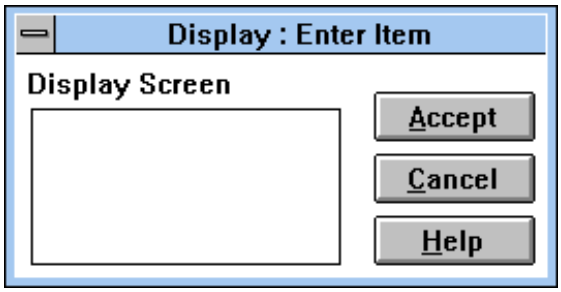
Figure 2-15. The Collect Data nodes



THE DISPLAY : ENTER ITEM NODE You need to set up this node to display "Enter Item:" on the first line of the portable's screen and have the fourth line of the screen tell the user to press **F4** to return to the Main Menu. Complete the following steps to set up the node:

1. Select the **Display : Enter Item** node to open the node's dialog box (see figure 2-16).

Figure 2-16. The Display : Enter Item dialog box

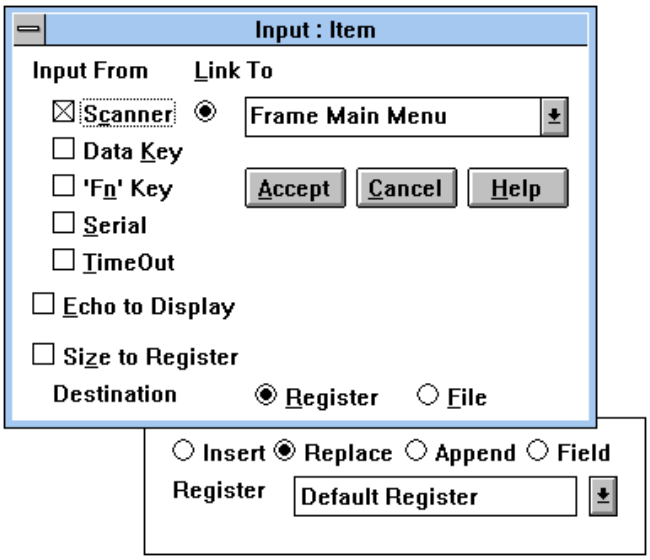


2. Type **`Enter Item:`** on the first line of the text entry area.
3. Press **ENTER** three times, and type **`Menu`** on the fourth line.
4. Select **Accept** to save your settings.

THE INPUT : ITEM NODE Complete the following steps to set up this node:

1. Select the **Input : Item** node to display its dialog box (see figure 2-17).

Figure 2-17. The Input : Item dialog box



2. The **Input From** check boxes let you indicate which sources of input you want the portable to accept. Select the **Scanner**, **Data Key**, and **'Fn' Key** check boxes. This will allow the user to input data by scanning or pressing keys.

   A radio button appears next to each selected check box. These buttons let you specify a different **Link To** setting for each type of input allowed. In this case, you want wand (scanner) and data-key input to link to the **Verify : Input** node and function key input to return the user to the Main Menu.

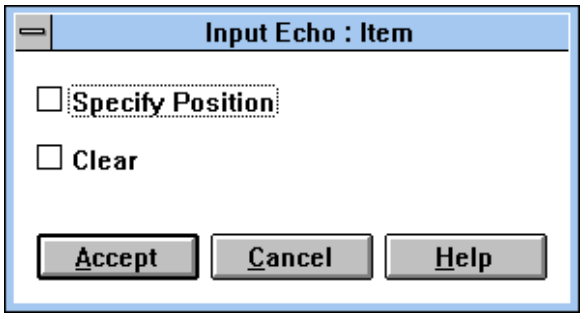
3. Select the radio button next to the **'Fn' Key** option, and then click on the **down-arrow button** to the right of the **Link To** input box. A list of the nodes or frames that the Input node is linked to is displayed.

4. Select **Frame Main Menu**. This tells the program to return to the Main Menu whenever the user presses a function key.

5. If you created the link to the Verify node first, all input types will link to that node by default, and you won't need to adjust the settings. Otherwise, set the other selected input types to **Verify Input**.

6. You want the user to see the data as it is being entered, so select the **Echo to Display** check box. This displays the characters being entered with the data keys on the portable's screen. To specify the exact position of the display on the screen, click on the **right-arrow button** to the right of the check box. The **Input Echo : Item** dialog box appears (see figure 2-18).

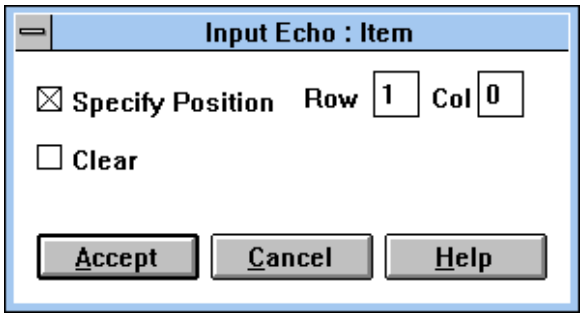
Figure 2-18. The Input Echo : Item dialog box



The **Echo to Display** option displays keyed-in characters only until the user presses the **ENTER** key. Once the data is entered (or scanned), the program moves on through the next nodes and redisplays the menu text, overwriting the echoed characters. To avoid this, you would need to add Output nodes to reposition the cursor and display the echoed characters on a different line. This is demonstrated later in the tutorial.

7. Select the **Specify Position** check box. Input boxes appear, allowing you to indicate the exact row and column you want the echoed data to begin on. Position it on the second row and first column. Columns and rows are numbered starting with 0 instead of 1; so enter **1** in the **Row** box to indicate the second row and **0** in the **Col** box to indicate the first column (see figure 2-19).

Figure 2-19. The Input Echo dialog box

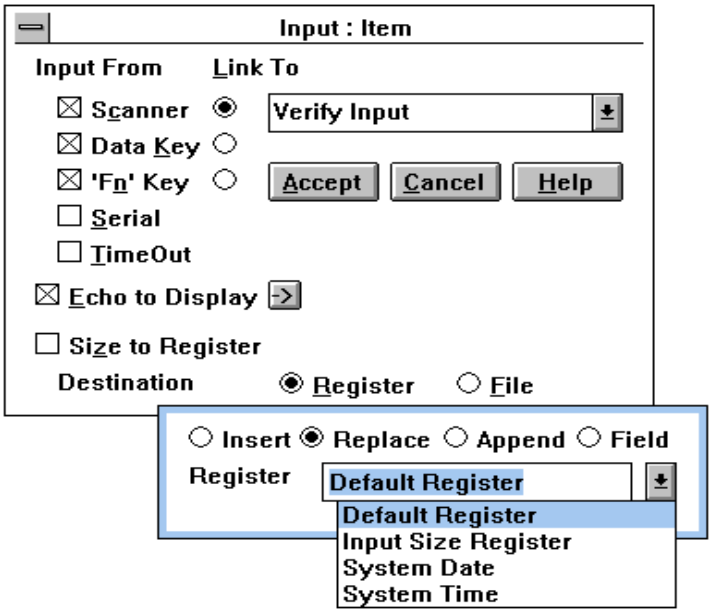


8. Select **Accept**. Now you need to create a special register for the input data to keep it separate from other data.

A *register* is a temporary holding place for data. Unless you specify otherwise, the program stores input data in a register named Default Register. You can use numerous registers in a program, storing different types of information in different registers.

9. Click on the **down-arrow button** to the right of the **Register** input box in the subdialog box below the main one. A list of the program's existing registers appears, as shown in figure 2-20.

Figure 2-20. The list of the program's registers



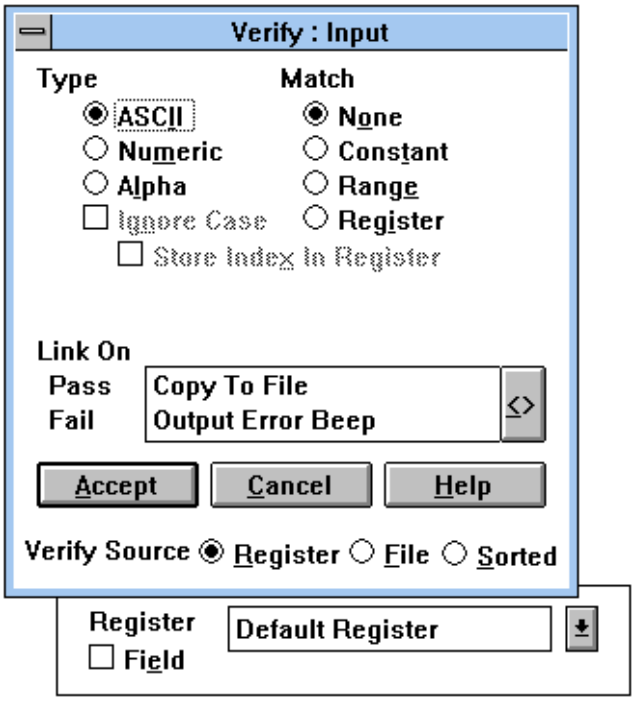
To delete an unwanted register, select it in the list, and then press **DELETE**.

10. Type **`Inventory`** in the input box to create a new register named Inventory. The **Replace** option (selected by default) clears existing data from the register before storing newly input data.
11. Select **Accept** to save your settings and exit the dialog box.

THE VERIFY : INPUT NODE The **Verify : Input** node ensures that the data entered is numeric. If the data isn't numeric, the node passes control to the Output and Display nodes, which sound a beep and display an error message. Complete the following steps to set up this node:

1. Select the **Verify : Input** node to display its dialog box (see figure 2-21).

Figure 2-21. The Verify : Input dialog box



2. Select the **Numeric** radio button under the **Type** option. Because you don't want to verify any specific number, leave the **Match** option set to **None**.

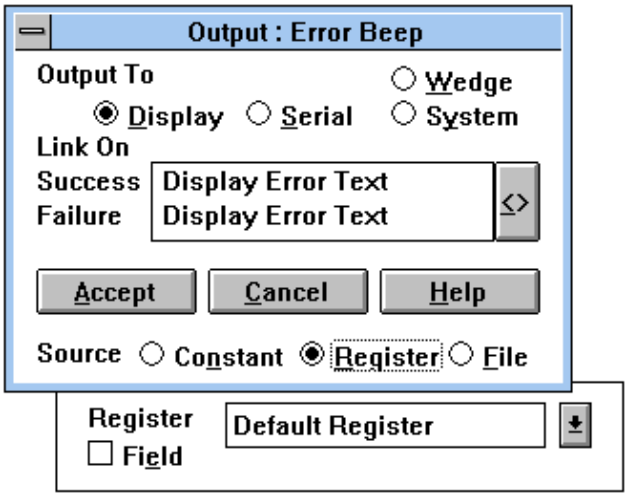
3. The **Link On** option is automatically set according to the links you create. The top link always defines the **Pass** setting. It should be set to go to the **Copy : To File** node if the data is numeric (**Pass**) and the **Output : Error Beep** node if it's not (**Fail**). If these settings are reversed, click on the **switch button** next to the option to switch them.

4. You also need to tell the program what register to verify. Click on the **down-arrow button** next to the **Register** input box, and choose **Inventory** from the list. (You may need to scroll down through the list to find it.)
5. Select **Accept** to save your settings and exit the dialog box.

THE OUTPUT : ERROR BEEP NODE Now you need to set the **Output : Error Beep** node to sound a beep. Complete the following steps:

1. Select the **Output : Error Beep** node to display its dialog box (see figure 2-22).

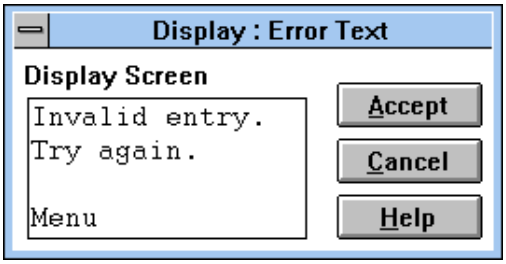
Figure 2-22. The Output : Error Beep dialog box



2. Select **System** as the **Output To** setting and **Constant** as the **Source** setting. In the new input box that appears, enter the characters **.+** (period and plus). This is a special code telling the program to sound a high beep. (You can enter **.–** to sound a low beep.) Because the system already beeps once when a code is scanned, this causes it to beep twice on an error.
3. Select **Accept** to save your settings and exit the dialog box.

THE DISPLAY : ERROR TEXT NODE You can have a special message appear when the error beep is sounded. Select the **Display : Error Text** node, enter the text shown in figure 2-23, and select **Accept**.

Figure 2-23. The Display : Error Text dialog box

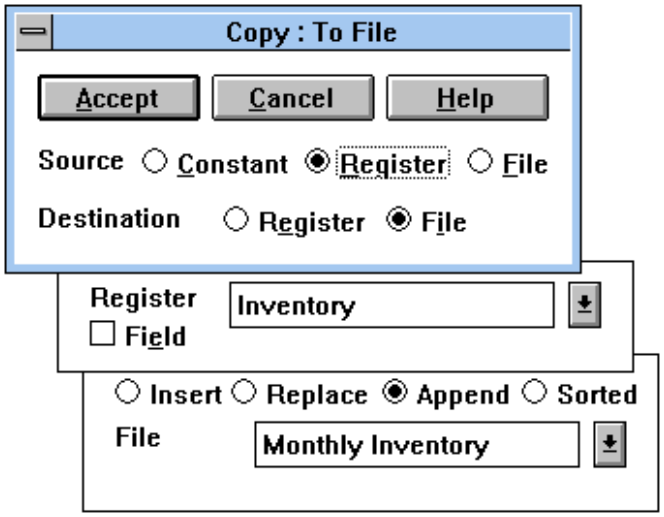


THE COPY : TO FILE NODE Finally, you need to set up the **Copy : To File** node to copy data from the Inventory register to a portable file for transmittal back to the PC. Each time new data is scanned or entered, existing data in the Inventory register is replaced, and so the data has to be copied and appended to a data file.

Complete the following steps:

1. Select the **Copy : To File** node to display the dialog box (see figure 2-24).

Figure 2-24. The Copy : To File dialog box



2. The copy **Source** is already set to Register. Click on the **down-arrow button** next to the **Register** input box and select the **Inventory** register.
3. For the Destination setting, select **File**, and then enter **`Monthly Inventory`** in the **File** input box.

Because this is a portable file and not a DOS file, the file name can include spaces and more than eight characters.

4. Select **Accept** to save your settings and exit the dialog box.

Select either the Entry or Exit node to return to the Frames level of the program. Then select **File**⇨**Save** to save your changes to the file.

This time, because you've already named the file, PPG saves your changes without prompting you for a file name.

The **Collect Data** nodes you created prompt the user to enter data, and they accept that data either through scanning or data keys. If the data is verified as numeric, it is appended to a data file named Monthly Inventory. If it's not numeric, the portable beeps and displays an error message. Pressing a function key brings back the Main Menu.

Creating and Setting Up the Upload Data Nodes

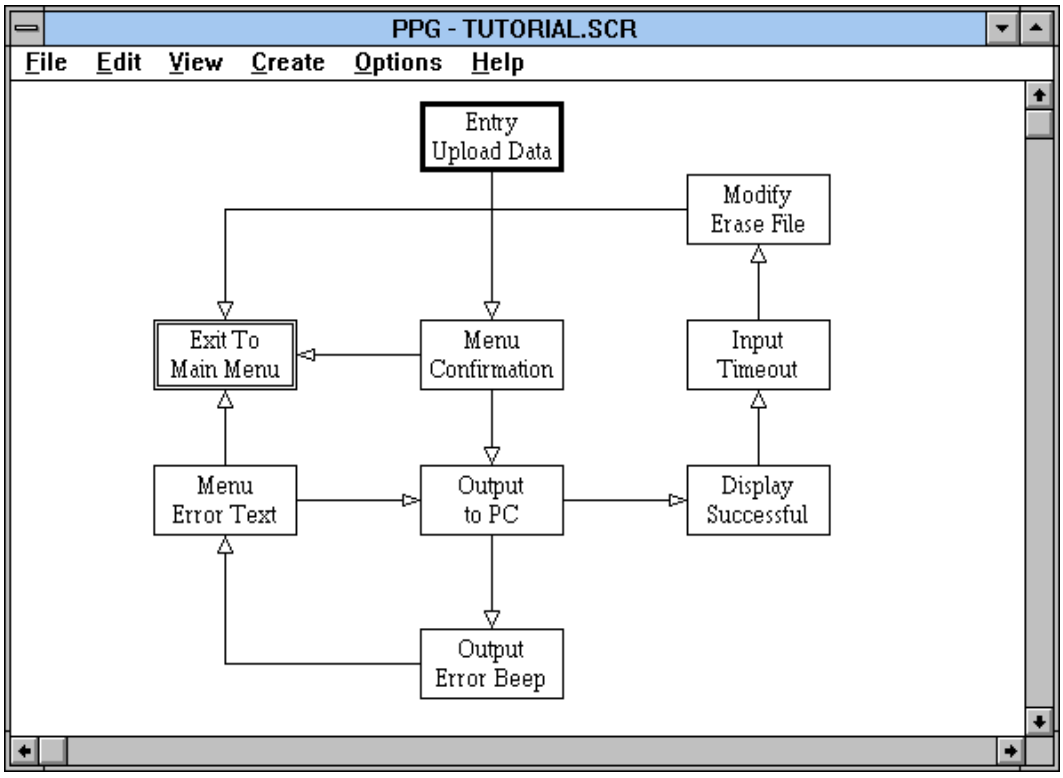
The last frame, **Upload Data**, allows the user to copy collected data from the portable's file to a file on the PC. You will set up nodes that do the following:

- Display a menu asking if the user wants to upload data.
- If the response is **Yes** (**F3**), send data over the serial connector to the PC. If the response is **No** (**F4**), exit to the Main Menu.
- If the output is successful, display a message saying so for 45 seconds (or until the user presses a key), and then clear the portable's file and return to the Main Menu. If the output is unsuccessful, beep and display an error message, and then redisplay the prompt.

Create nodes for the **Upload Data** frame by completing the following steps:

1. Select the **Upload Data** frame to move into its Nodes level.
2. Reposition the Entry and Exit nodes as shown in the completed flow chart in figure 2-25.
3. Create and name the new nodes shown in figure 2-25, and add the links as shown.

Figure 2-25. The Upload Data nodes

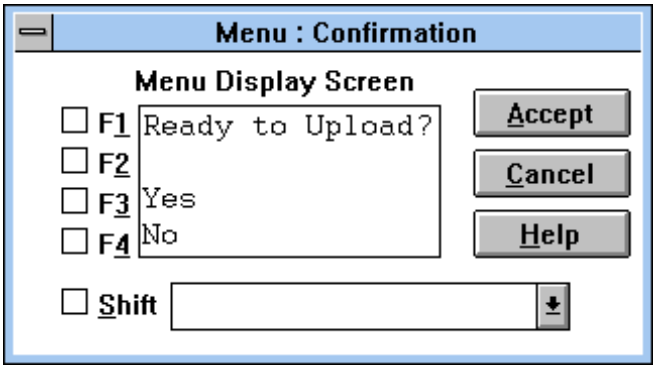


When creating the links from the **Output : to PC** node, create the link to the **Output : Error Beep** node first. Two links are automatically created, one on top of the other. Place the mouse pointer over the arrow of the top link, press and hold down the left mouse button, and drag the link to the **Display : Successful** node. The underlying link stays in place.

THE MENU : CONFIRMATION NODE Complete the following steps to set up this node:

1. Select the **Menu : Confirmation** node to open its dialog box, and enter the text shown in figure 2-26. (Be sure to leave the second line blank.)

Figure 2-26. The Menu : Confirmation dialog box

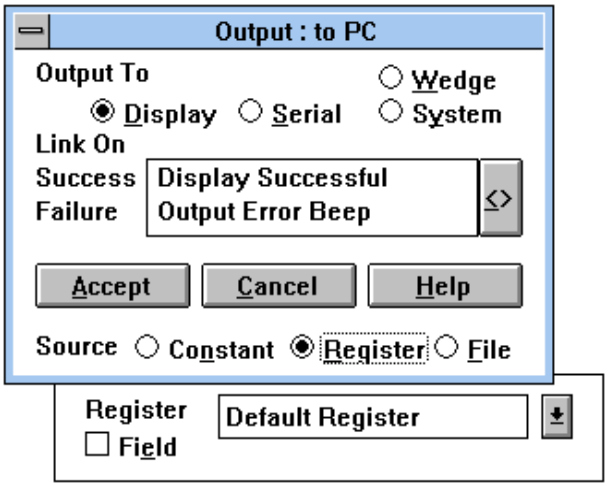


2. Select the **F3** check box. Then click on the **down-arrow button** next to the input box, and select **Output to PC** from the drop-down list. This will make the portable begin outputting data when the user presses **F3**.
3. Select the **F4** check box, and select **Frame Main Menu** from the drop-down list. This will redisplay the Main Menu when the user presses **F4**.
4. Select **Accept** to save your settings and exit the dialog box.

THE OUTPUT : TO PC NODE Complete the following steps to set up this node:

1. Select the **Output : to PC** node to open its dialog box (see figure 2-27).

Figure 2-27. The Output : to PC dialog box



2. Select the **Serial** setting for **Output To**. This will send the output to the serial port of the portable, which should be connected to the serial port of the PC.
3. Make sure the **Link On Success** option is set to **Display Successful** and **Failure** is set to **Output Error Beep**.

4. For the **Source** option, select **File**. Then click on the **down-arrow button** next to the **File** input box, and select **Monthly Inventory** from the drop-down list.
5. Select **Accept** to save your settings and exit the dialog box.

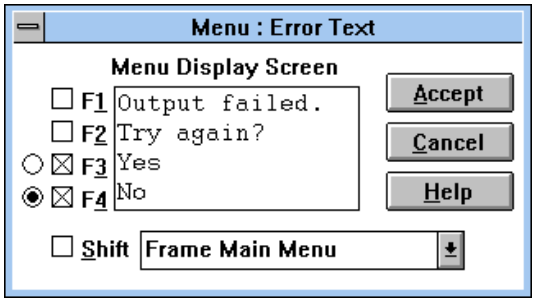
THE OUTPUT : ERROR BEEP NODE Complete the following steps to set up this node:

1. Select the **Output : Error Beep** node to open its dialog box.
2. Select **System** as the **Output To** setting and **Constant** as the **Source** setting.
3. Enter **.+** in the **Source** input box.
4. Select **Accept** to save your settings and exit the dialog box.

THE MENU : ERROR TEXT NODE Complete the following steps to set up this node:

1. Select the **Menu : Error Text** node and enter the text shown in figure 2-28.

Figure 2-28. New text for the Menu : Error Text node

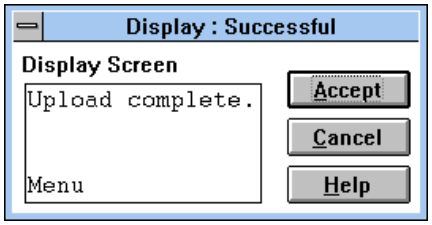


2. Select the **F3** check box and choose **Output to PC** from the drop-down list. Select **F4** and choose **Frame Main Menu**. This will try outputting again if the user presses **F3** and return to the Main Menu if the user presses **F4**.
3. Select **Accept** to save your settings and exit the dialog box.

THE DISPLAY : SUCCESSFUL NODE Complete the following steps to set up this node:

1. Select the **Display : Successful** node to open its dialog box.
2. Enter the text shown in figure 2-29.

Figure 2-29. Display text for successful upload



A Menu node is not necessary here, because only one option is given, and it is executed if *any* function key is pressed, not just **F4**. The Input node that follows this one will see to that.

3. Select **Accept** to save your settings and exit the dialog box.

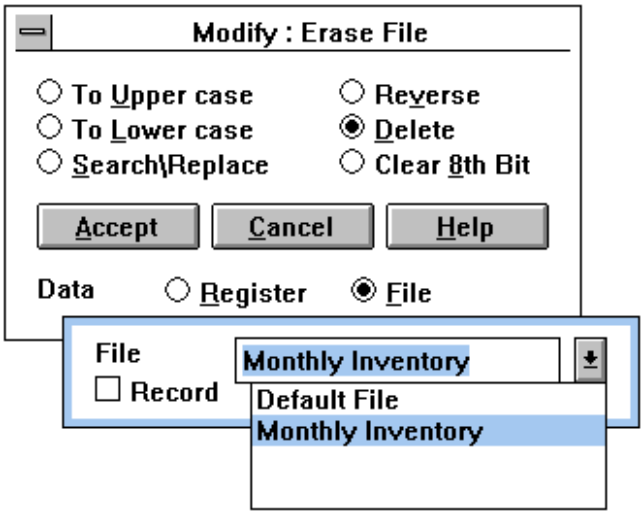
THE INPUT : TIMEOUT DISPLAY NODE Complete the following steps to set up this node:

1. Select the **Input : Timeout Display** node to open its dialog box.
2. Select the **Scanner** check box to turn it off. (There should be no **X** in the box.)
3. Select the **'Fn' Key** and **TimeOut** check boxes.
4. Enter **45** in the **Seconds** input box that appears next to **TimeOut**. This instructs the program to return to the Main Menu if the user presses a function key or if 45 seconds pass with no input.
5. Select **Accept** to save your settings and exit the dialog box.

THE MODIFY : ERASE FILE NODE Once you've uploaded data from your portable file, you'll probably want to erase its contents. Otherwise, further data you collect will be appended to the data you just uploaded, and your data file will quickly grow out of control. Complete the following steps:

1. Select the **Modify : Erase File** node to open its dialog box.
2. Select the **Delete** radio button.
3. Select **File** as the Data setting, and choose **Monthly Inventory** from the drop-down file list (see figure 2-30).

Figure 2-30. The Modify : Erase File dialog box



4. Select **Accept** to save your settings and exit the dialog box.

The nodes for uploading data are now complete. Select either the Entry or Exit node to return to the Frames level. Then select **File**⇨**Save** to save your changes to the file.

The nodes that you created for the **Upload Data** frame ask the user for confirmation of the upload task. If the user answers **Yes**, it outputs the data file over the serial port. If the upload is successful, a message is displayed, the portable's file is cleared, and the Main Menu returns. If the upload is unsuccessful, the program beeps, displays an error message, and gives the user the option of trying again.

Your portable program should now be complete.

> **Want a Break?** If you're ready for a break, you can easily stop here. Since you saved your file, so you won't lose any work if you exit PPG or turn off your computer.

Emulating the Program

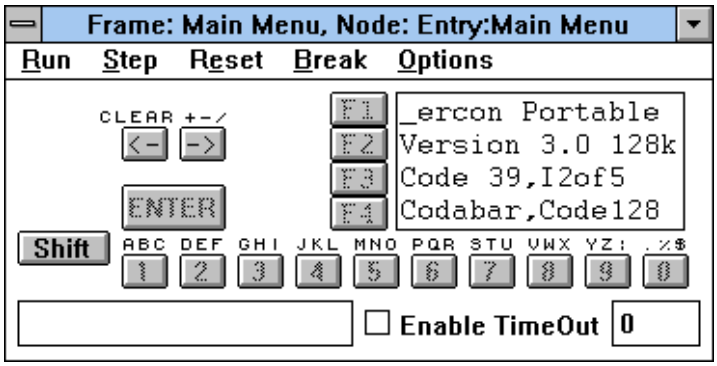
The Emulation window lets you test your program before you load it into the portable. It runs through your program step by step, displaying exactly what would appear on your portable screen and responding to your input just as the portable would. You can see if the program will work as you expected.

Use the Emulation window now to test your program. Complete the following steps:

1. If you're returning from a break and had exited PPG, double-click on the PPG icon in the Windows Percon PPG31 program group.
2. Select **File**⇨**Open**, choose **`tutorial.scr`** from the file list, and select **OK** to load the file into the PPG window.
3. Select **View**⇨**Emulation** to open up the Emulation window. By default, the window is modeled after the face of a Percon PocketReader™ portable, with the display screen on the right and keys below and to the left (see figure 2-31). If you choose **PT 2000** from the **Options** menu, however, the window changes to look like a PT 2000™ portable.

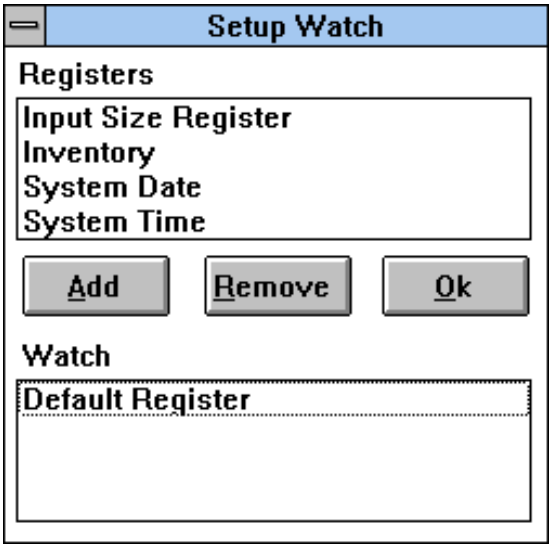
   In either case, the name of the emulated program's current frame and node are displayed in the title bar. Commands in the menu bar let you run the program and set emulation options. An input box displays data you enter, and a check box lets you enable or disable the timeout setting, if any. When timeout is enabled, the timeout value is counted down in the adjacent input box.

Figure 2-31. The Emulation window



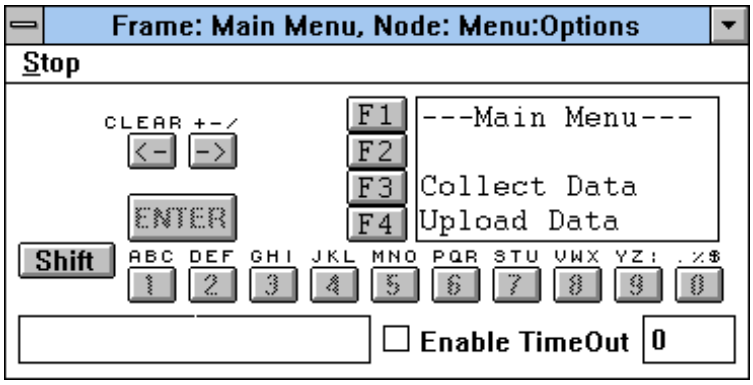
4. Select **Options**⇨**Watch** from the menu to open the PPG Watch window. This window displays the contents of given registers while the program is running. You'll use it to view the contents of the Inventory register as you input data.
5. Select **SetUp** from the PPG Watch menu bar. The Setup Watch dialog box appears, listing all named registers for the program (see figure 2-32).

Figure 2-32. The Setup Watch dialog box



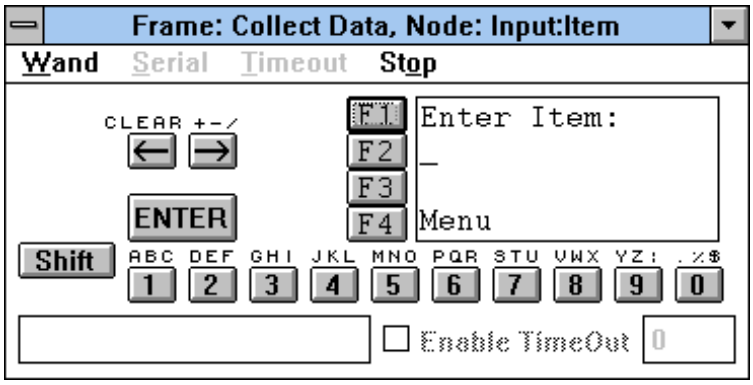
6. Select **Inventory** from the **Registers** list and click on the **Add** button to move it to the **Watch** list below it. Then select **Default Register** from the **Watch** list and select **Remove** to delete it from the list. Select **Ok**.
7. Select **Run** from the Emulation window's menu bar to start the program. The portable's screen area displays the Main Menu you set up, and the menu bar changes to a single command (see figure 2-33). In addition, the function keys (**F1**–**F4**) are no longer dimmed, meaning that they are now available for use.

Figure 2-33. The Main Menu displayed in the Emulation window



8. Click on the **F3** button in the window to choose the **Collect Data** option. Text from the **Display : Enter Item** node appears in the screen area, prompting you to input data, and the menu bar changes to show the following commands: **Wand**, **Serial**, **Timeout**, and **Stop** (see figure 2-34).

Figure 2-34. The Emulation window prompting for input



The first three commands let you simulate a specific type of input; only **Wand** input can be selected at this point. The **Stop** command halts program emulation.

9. Enter **123456** in the input box by clicking on the data keys on the screen.
10. Select the **Wand** menu option to emulate scanning. The number is stored in the Inventory register (as you can see by checking the PPG Watch window), and the input box is cleared for further input.
11. Enter **98765** in the input box and click on the **ENTER** button in the window to emulate keying in a number. This number replaces the previous one in the Inventory register, and the input box is cleared.

12. Now enter **Q1234** in the input box and select the **Wand** option. The emulator beeps, the screen area shows the “Invalid Entry. Try Again” message, and the input box is cleared. The invalid number is stored in the register (as shown in the PPG Watch window), but it is not copied to the file.

To enter a letter, click on the **Shift** button in the window until the letter you want appears on its designated key, and then click on that key. For example, to enter Q, click on the **Shift** button twice and then click on the **PQR** key, in which the letter Q should be visible.

13. Reenter the number, this time without the letter (**1234**), and select **Wand**.
14. Click on the **F4** button in the window to return to the Main Menu.
15. Click on the **F4** button again, this time to choose the **Upload Data** option. The screen area displays “Ready to Upload?” and offers **Yes** and **No** options.
16. Click on the **F3** button for **Yes**. The emulator pretends to write the data to a file (it never actually alters any files) and displays the “Upload complete” message.
17. Click on the F4 button to return to the program's Main Menu.
18. Select **Stop**, and then select **Options**⇨**Watch** again to close the PPG Watch window.

19. Double-click on the Emulation window's **Control-menu box** to close it and return to PPG.

You can use other Emulation commands to run only the next step of a program, set breakpoints at which you want to pause the program, and display a “Trace” window that documents every action taken. See chapter 3 for details.

If you encountered any problems or unexpected results as you ran the program in the Emulation window, you should recheck your program against the steps in the “Building Your Own Portable Program” section.

Loading and Using the Program

Now that your program is tested and complete, it's time to load it into the portable and try it out. Complete the following steps:

1. If the cable is not already connected to your portable and the PC, connect it now (as described on page 15).
2. Turn the portable on.
3. In the PPG window, select **File**⇨**Download Program**. (If you are prompted to save your changes, answer **Yes**.)

The Percon Portable Compiler window appears while PPG compiles the program. When compiling is complete, the Percon Portable Programmer window displays the message “Initiating Download.” If connection is successful, the program is loaded into the portable. When downloading is complete, the message “Portable successfully programmed” appears in the Percon Portable Programmer window, and the program's Main Menu is displayed on the portable’s screen.

If You Have Problems

If a few seconds pass with no messages, PPG was unable to make the connection with the portable. Select the **Comm2** command on the Percon Portable Programmer menu bar to select a different serial port, and then select the **Download Program** command to try again. Also, make sure that the cable is firmly connected at both ends. You might try resetting the portable by holding down **Shift+Enter** while you reload the battery.

If you loaded a different program into your portable since downloading the sample program earlier, the portable may not be set to allow serial input, or the serial parameters may not be set correctly. In this case, scan the following bar code or select options in the portable to prepare it for downloading.

4. Double-click on the Percon Portable Programmer window's **Control-menu box** or select **File⇨Exit** to close the window. (If downloading was unsuccessful, choose **Abort** from the menu bar first.)
5. Double-click on the **Control-menu box** in the Compiler window to close it.
6. Disconnect the portable from the cable, and press the **F3** key to begin collecting data.
7. Scan the following bar codes at least once. Each time a code is scanned correctly, you should hear a single beep. (You won't see the scanned codes on the portable’s screen, because they are overwritten by the redisplayed menu once the data is input.) When you scan the last code, which contains an alphabetic character, you'll hear a double beep, indicating an error.

8. Now enter the following codes using the portable's data keys. The portable will beep each time you press a key. Press **ENTER** after each complete number.

   12345
   67890
   98765
   54321

9. Press the **F4** key to return to the program's Main Menu.

Uploading Data from the Portable

Now use the PTFER program to upload the data you collected to your computer. Complete the following steps:

1. Click on the **Minimize button** in the PPG window to temporarily put it out of sight.

2. Back in the Windows Program Manager, double-click on the **PTFER** icon in the Percon PPG31 program group to display the PTFER window.
3. If your serial port is not COM2, select **Options**⇨**Settings** from the menu, select the correct COM port, and select **Ok**.
4. Select **Options**⇨**Connect**. A message appears in the window, saying the connection was successful.
5. Select **File**⇨**Receive**. In the Receive File dialog box, type the file name **`invntory`** and select **OK**. The file name appears in the PTFER window's title bar, with the .TXT extension added automatically.
6. Reconnect the cable to the portable, and press the **F4** key (for **Upload Data**) on the portable.
7. Press the **F3** key (for **Yes**) to confirm uploading.

   The data that you scanned and entered is immediately transferred from the portable's file called "Monthly Inventory" to a DOS file on your PC called INVNTORY.TXT.

If this doesn't happen, check your connections and COM port setting, and try again. The portable defaults to 9600 baud, no parity, 8 data bits, and 1 stop bit. To reset the portable to these defaults, scan the following:

8. Double-click on the PTFER window's **Control-menu box** or choose **File**⇨**Exit** to close the window.

For complete information about PTFER (including running it with command line options), see "Using PTFER," beginning on page 94.

Creating and Using Templates

The programs you've worked with so far handle singular information: You scan or enter one code at a time, and the data is stored one entry per line. But suppose you wanted to collect sets of different types of data. If you were taking inventory, for example, rather than scanning each item in a group of identical products, you might want to scan only one of them and then use the data keys to record the number of items in the group.

You could add another Input node to the **Collect Data** frame of your program to store the types of data in different registers, but the data file you would end up with would have code numbers and quantity numbers on alternate lines, as in the following:

```
3849293
5
9385834
12
9848495
8
```

This arrangement of data would be difficult for an inventory or database program to interpret. Most programs expect to see related values on the same line, as in the following:

```
3849293, 5
9385834, 12
9848495, 8
```

In this arrangement, each line is referred to as a *record,* and each item on the line is called a *field.* The database program can be set up to treat the first field as an inventory code and the second as a quantity value.

The way you tell a portable program to arrange data as fields in records is with a *template*. A template defines the structure used to access data. Most often, a template is used to combine values in two different registers as fields in a single register. The fields are either set to a fixed length (so that they appear in columns in the data file), or they are allowed a variable length with a separator (such as a comma) separating them. However, you can also use a template to break apart data stored in a register into separate fields.

You will incorporate a template into the TUTORIAL program to collect and store quantity values along with each item number. To do this, you'll add the following new nodes to the existing TUTORIAL program:

- A new Display node that will prompt the user to enter a quantity value after an item number is entered
- A new Input node that will use a template to store the quantity value in a register field
- Two Output nodes that will display the last-entered item and quantity values as a pair

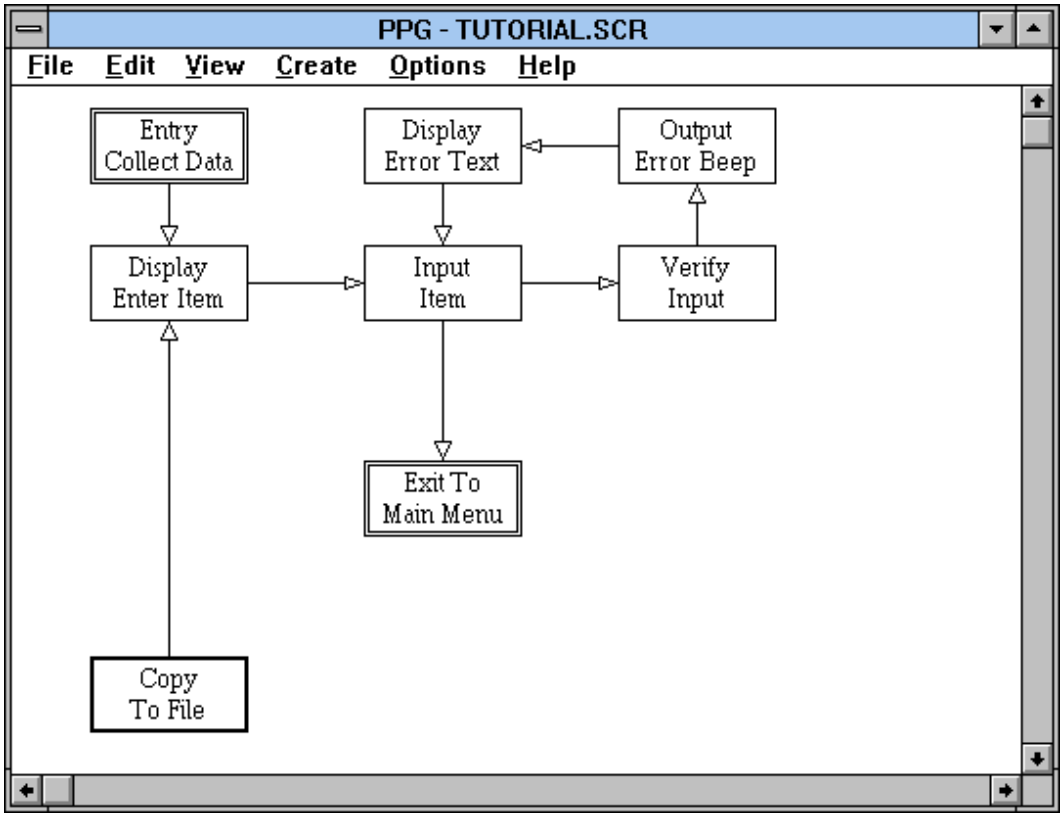
You'll also alter the existing Input node to use a template.

Creating the New Nodes

Create the new nodes by completing the following steps:

1. Double-click on the **PPG icon** at the bottom of the Windows desktop to reopen PPG.
2. The TUTORIAL program file (TUTORIAL.SCR) should still be loaded, but if it isn't, use **File**⇨**Open** to load it. (Your screen will have links not shown in the figure.)
3. At the Frames level, select the **Collect Data** frame, and reposition the nodes as shown in figure 2-35.

Figure 2-35. The repositioned Collect Data nodes



4. Delete the link from the Verify node to the Copy node.

To delete a link, use the mouse to drag its arrowhead away from a node, and double-click the left mouse button.

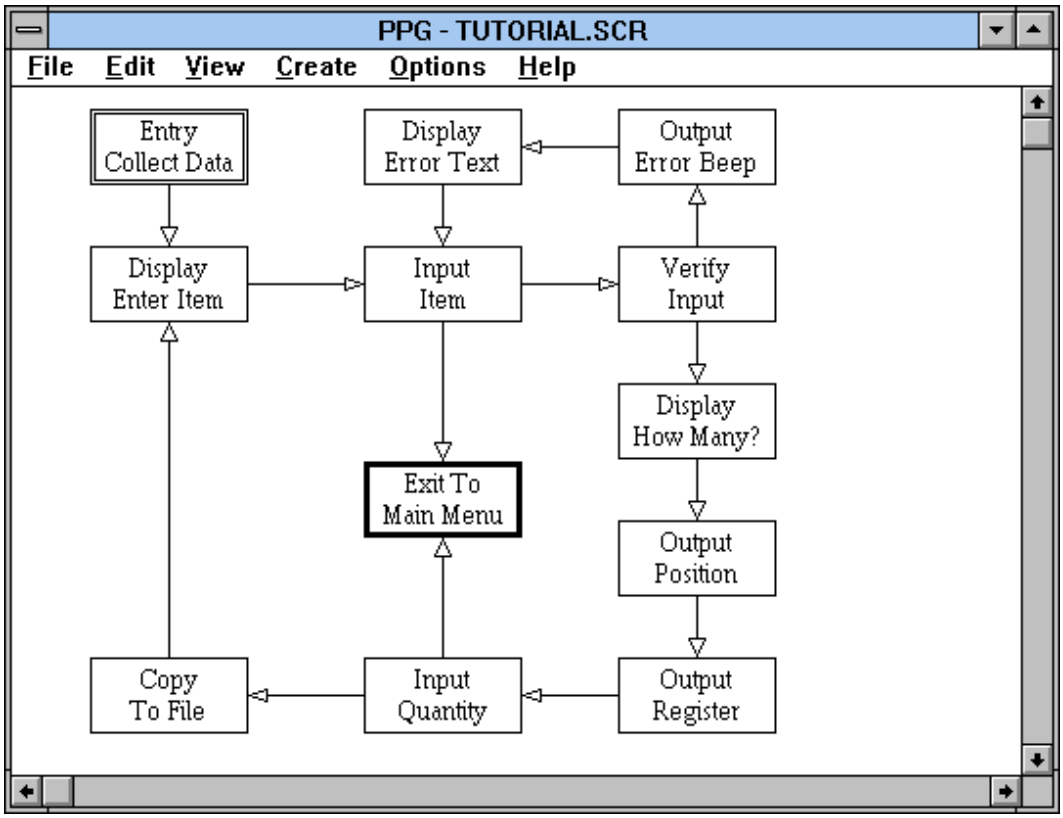
5. Adjust the links from the Copy node to the Display node and from the Input node to the Exit node so that they are no longer jointed.

You can either delete existing links and create new ones or drag the joints of the links until they line up.

6. Add the new nodes and links shown in figure 2-36, and rename the nodes as shown.

Select **Create**⇨**Lock** and then click the **right mouse button** to cycle through the items you can create.

Figure 2-36. The new Collect Data nodes



7. Select the new Display node (**Display : How Many?**), and enter **How Many?** on the first line and **Menu** on the fourth. Then select **Accept**.
8. Skip over the two Output nodes for now, and select the new Input node (**Input : Quantity**). Select the **Data Key** and **'Fn' Key** check boxes, and select the **Scanner** option to turn it off. Link the **'Fn' Key** setting to **Frame Main Menu** and the **Data Key** setting to **Copy to File**.
9. Select the **Echo to Display** check box and click on the **right-arrow button** next to it. Select the **Specify Position** option and enter **1** in the **Row** input box and **0** in the **Col** box. Then select **Accept**.

Creating the Fields

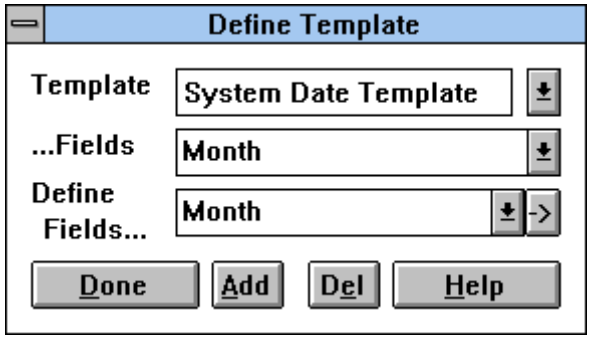
Create the template fields by completing the following steps:

1. In the subdialog box at the bottom of the Input : Quantity dialog box, click on the **down-arrow button** next to the **Register** input box, and choose **Inventory** from the drop-down list. (Do not select **Accept** yet.)

Inventory is the same register used to store the item number. To keep one value from being overwritten by the other, you will create a template that divides the register into two fields: one for the quantity and one for the item number.

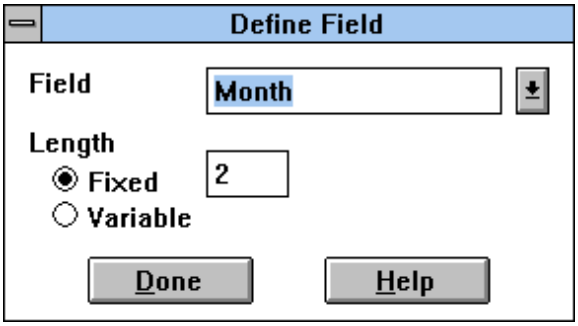
2. To create the template name, select the **Field** radio button in the subdialog box. Two new input boxes appear: **Template** and **Field**. Click on the **right-arrow button** next to the **Template** input box to display the Define Template dialog box (see figure 2-37). Type **`Combine`** in the Template input box for the new template's name.

Figure 2-37. The Define Template dialog box



3. Now create the field names and define their lengths. Click on the **right-arrow button** next to the **Define Fields** input box to display the Define Field dialog box (see figure 2-38). You will define two fields for this template: **Item** and **Quantity**. Type **`Item`** in the **Field** input box. Because you don't want to limit this field to any specific length, select the **Variable** radio button and enter a comma (**`,`**) in the **Delimiter** input box. This will separate the two values with a comma. Then select **Done**.

Figure 2-38. The Define Field dialog box



4. Click on the **right-arrow button** next to the **Define Fields** input box again. This time, type **`Quantity`** in the **Field** input box, select **Variable**, and enter a space in the **Delimiter** box. Select **Done**.

5. Next, you will define the order of the fields in the template. Click on the **down-arrow button** next to the **Define Fields** input box to see your new fields included in the list of possible fields. Select **Item** from the list, and select the **Add** button to add it to the list in the **Fields** input box. Click on the **down-arrow button** again and select **Quantity**. Then select **Add**.

You may need to scroll through the list to find the fields you want.

6. Click on the **down-arrow button** next to the **Fields** input box to see both **Item** and **Quantity** listed as fields for the Combine template. Select **Done**. You can now use the templates and fields in the nodes.

7. In the subdialog box below the Input : Quantity dialog box, click on the **down-arrow button** next to the **Template** input box, and choose **Combine**. Set the **Field** input box to **Quantity**. This tells the program to store the value input after the “How Many?” prompt in the **Quantity** field of the Inventory register. Select **Accept**.

8. Now you can specify storing the input item number in the Item field of the register. (The program will work correctly whether or not you perform this step.) Select the other Input node (**Input : Item**) and select the **Field** radio button in the Register sub-dialog box. Select **Combine** from the **Template** drop-down list, and then select **Item** from the **Field** drop-down list. Select **Accept**.

9. The two new output registers make it possible to display the Item value without over-writing the “How Many?” prompt. Select the first one (**Output : Position**), and select the **Constant** radio button in the dialog box. Then enter the following in the input box that appears:

\x1B[2;0f

Enter the characters exactly as shown. (The eighth character is a zero, not the letter O.)

This character string is a special code recognized by PPG. It positions the cursor in the first column of the third row. (Further output commands are described in chapter 3.) Be sure the **Output to Display** option is selected (it’s the default), and select **Accept**.

10. Select the other Output node (**Output : Register**), select **Inventory** from the **Register** drop-down list, and select **Accept**. This displays the contents of the Inventory register at the cursor position on the portable’s screen.

11. Select **File**⇨**Save** to store the changes you've made.

12. Connect the portable to your PC as described earlier, and select **File**⇨**Download**. The new program is compiled and loaded into the portable. When it's done, you can experiment with collecting data using the new program. Notice that after you enter the item and quantity values, both entries are displayed together on the third line, separated by a comma.

This is the end of the tutorial. What you've learned here should give you the understanding and background you need to develop your own portable programs. The next chapter will give you all the specific information required. It covers every detail of each available option.

Chapter 3
User's Guide

This chapter gives you details on every command and option available within Percon Program Generator (PPG). The following subjects are covered:

- Using online help and working with a mouse
- Creating frames, subroutines, nodes, and links to build a program
- Making adjustments to a program flow chart
- Setting program options, such as the types of bar codes to be read
- Saving, opening, closing, and printing program flow chart files
- Using the Emulation window to debug a program flow chart
- Downloading a program into the portable
- Transferring data between the portable and the PC
- Using templates and files to organize and format collected data

Once you've read this chapter, you may want to return to it from time to time for information about procedures and options.

Using Online Help

While you're working in PPG, you can easily access online help for specific commands, procedures, or concepts. There are four ways you can get help:

- **Press F1.** The help screen that appears depends on where you are in the program and what you're doing. If a menu command is highlighted, the help screen describes that command.
- **Select the Help button.** Most dialog boxes in PPG include a Help button. Select this button to display help about the dialog box's options.

- **Press SHIFT+F1.** A question mark appears next to the mouse pointer. Use this pointer to click on an area of the screen you want help on.
- **Select a command from the Help menu.** Commands in this menu take you to different areas of the online help system. Contents displays the main help screen, which lists general help topics. About PPG displays a Percon identification screen that shows the version number of your program.

All online help screens are linked together via *jumps*, which are graphics or text that lead to a different help screen when selected. Text jumps are identified by a different color and an underline. When you point to a jump, the pointer changes to a hand shape, as shown in figure 3-1. Click the left mouse button while pointing to a jump to display complete information on the topic.

Figure 3-1. The help pointer over a jump

When you click on a jump that has a dashed underline, a pop-up window opens. To close a pop-up window, click a mouse button or press a key.

The PPG help window contains its own menu bar of commands. You can use them to load another help file, print help screens, copy a help screen to the Clipboard, insert a graphic, set bookmarks for saving your place, display help on using help, and keep the help window from being covered by other windows.

The help window also includes a set of command buttons across the top. You can select these buttons to jump to the help contents screen, search for help on a given topic, jump to the previously displayed screen, and display a history of displayed screens that you can jump back to.

For detailed instructions on using all of the online help commands and features, press **F1** from within the help window or select **Help**⇨**How to Use Help** from the help menu bar.

When you're done using help, select **File**⇨**Exit** or, if you think you will want to use help again, press **ALT+TAB**. The help window does not close then, but instead it moves behind the PPG window. When you select help (or press **ALT+TAB**) again, the help window moves to the front.

Using the Mouse

Like most Windows applications, PPG makes extensive use of the mouse. Table 3-1 shows standard mouse techniques that have special effects in PPG.

Table 3-1. Mouse Techniques

Mouse Action	Effects
Left button, single click	• On an object, such as a menu command or frame, selects that object. • In Create mode, creates the object specified by the cursor label at the cursor position. • When creating a link, specifies the beginning or end of the link or a joint. • With two or more overlapped links selected, selects the next link in the stack.
Left button, double click	• At the Frames level, enters the Nodes level for the selected frame. • On an Entry or Exit node, reverts to the Frames level. • On any other node, opens the node's dialog box. • While holding a link, deletes that link.
Left button, press and hold; drag	• On an object, moves the object with the pointer until the button is released.Not on an object, draws a rectangle on the screen. All objects within the rectangle are selected and can be moved or adjusted at once.
Right button, single click	• On a frame or node, opens the Name dialog box. • In Create mode, selects the next option on the Create menu.
Right button, double click	• Places PPG in Create mode.

Depending on what you're doing with the mouse, the pointer changes to reflect the current action:

If you're making a simple selection or dialog box entry, the pointer is the standard arrowhead.

If you're creating an object, the pointer appears as a rounded box with a label that identifies the type of object you're creating.

When you're moving a frame, node, or link, the pointer changes to an open hand.

When you press **SHIFT+F1**, a question mark is added to the standard pointer, which you can position on a part of the screen you want help on. When you click the left mouse button, online help for that area appears.

Generating a Portable Program

The first step in generating a portable program is figuring out what you want the program to do. Put yourself in the end user's shoes and walk through the steps of the imagined program. Consider each action involved.

- How will the user start? Do you want to identify the user first by asking for a password or ID number? What about a log-on message?
- To offer a choice of actions, such as collecting and uploading data, you should probably set up a Main Menu that can be accessed from different areas of the program. List in this menu each general action the user might want to take. For example, in addition to collecting and uploading data, the user might want to erase a portable file or download a file from the PC. If an action will be taken only in a specific area of the program, however, you may not want it on the Main Menu. You can offer the option through another menu later. You may want to have the **F8** key in the Main Menu bring up a sign-on display showing the name of your program and its version number or creation date.
- In your mind, move through the individual steps involved in each major action. For example, will the user be collecting different types of data at different times? If your inventory is divided into categories, you might want the user to identify the category before collecting the data. This could be done with a "collection" submenu. For each action you would take as a portable user, imagine the options you would expect to have and the messages you would expect to appear on the screen.
- In what order will the actions be taken? Is there an obvious direction to the program? For example, a user would normally collect data and then upload it. This order should be reflected in the Main Menu and in the program flow.
- Are there steps that you might want to access from different areas of the program, such as writing data to a file or displaying the date? If so, you can save time and program size by putting these steps into a subroutine that can be called from different areas of the program.

You may want to sketch out the program flow chart first with pencil and paper. When you're ready, go into PPG and choose **File**⇨**New**, if necessary, to clear the window. Then use the **Create** menu commands (see pages 53–78) to build your program's flow chart.

Flow Chart Levels

There are two levels to every program flow chart: the *Frames level* and the *Nodes level.* You start in the Frames level, creating a *frame* for every major function of the program, and you use *links* to hook the frames together in the way that the program flows. For each frame in the chart, you also build a set of *nodes* that break down the frame's function into detailed steps. To access the Nodes level of a frame, double-click on the frame with the **left mouse button**, or select it and choose **View**⇨**Nodes**. To return to the Frames level, select one of the Exit or Entry nodes or choose **View**⇨**Frames**.

Testing Your Program

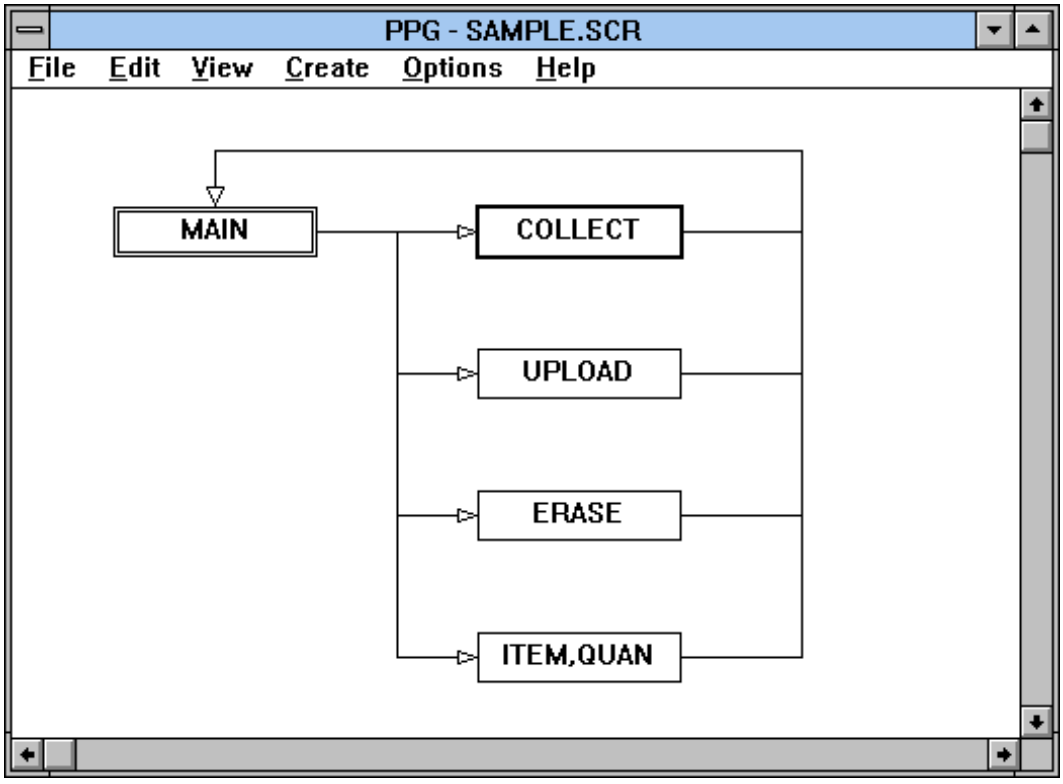
Once you've completed the flow chart, use the **View⇨Emulation** command to load it into an Emulation window for testing. To compile the program and load it into the portable, use the **File⇨Download Program** command.

Before you download a program into the portable, make sure the **Options⇨Set Bar Codes** command is set to decode the correct bar code symbologies (see “Specifying Bar Code Type,” on page 83).

Creating Frames

Each frame in a program flow chart represents a major function or option. Typically, a program's frames include a Main Menu frame and a frame for each option on the menu. Arrows, or links, connect the frames in a way that indicates program flow. Figure 3-2 shows the frames of a sample program.

Figure 3-2. The Frames level of a program



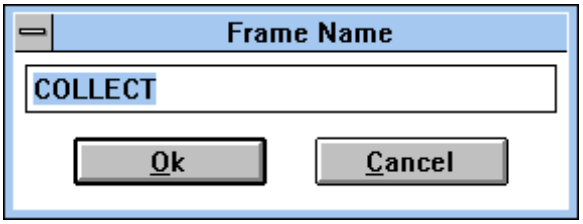
To create the frames of a program flow chart, complete the following steps:

1. Select the **Create**⇨**Frame** command from the menu. The pointer changes into a rounded box labeled "FRAME".
2. Position the box where you want to create the frame, and then click the left mouse button. A frame box named "Frame1" appears, and the arrow pointer reappears. (Frames are automatically numbered in the sequence in which they are created. The next frame you create will be named "Frame2".)

To reposition the frame, move the pointer to it, hold down the left mouse button, and drag the frame with the mouse. When the frame is positioned where you want it, release the mouse button.

3. To give the frame a more useful name, click on it with the **right mouse button** or select **Edit**⇨**Rename** from the menu to display the Frame Name dialog box (see figure 3-2). Enter the text you want displayed in the frame box, and select **Ok**.

Figure 3-3. The Frame Name dialog box



If you're creating several frames, you can lock PPG into Create mode so that you don't have to choose **Create**⇨**Frame** each time. Just select **Create**⇨**Lock** before selecting **Create**⇨**Frame**. After you create a frame, the FRAME pointer will remain visible so that you can click again to create another frame. When you're done, choose **Create**⇨**Unlock** or press **ESC** to exit Create mode and redisplay the arrow pointer, or click the right mouse button twice to begin creating links.

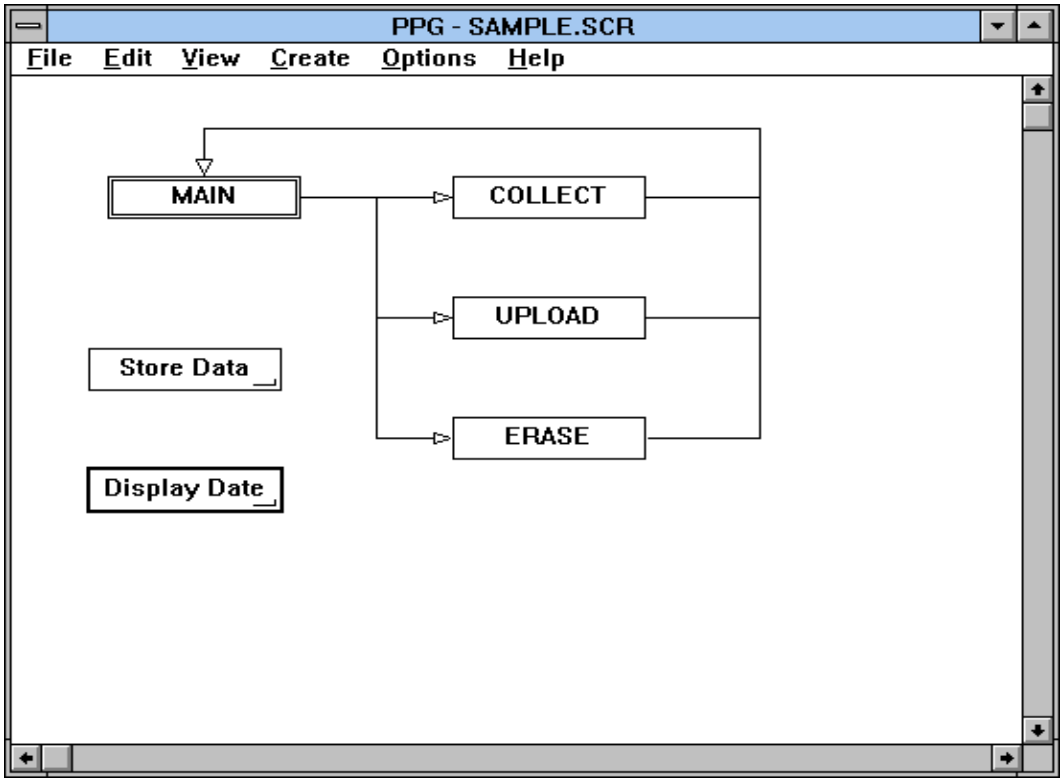
Use the **Options**⇨**Set Start** command to specify which frame to start the program with (see "Setting a Starting Place," on page 84).

Creating Subroutines

A subroutine contains nodes that execute program steps, very much like a frame. The difference is that a subroutine sits off to the side of a frame flow chart instead of being linked in with other objects. It contains functions that can be referenced within any of the program's frames.

Subroutines are handy for when your program uses the same sequence of nodes in several frames. Rather than repeating the nodes for each frame, you can put them in a subroutine on the Frames level and then use a Call node to reference the subroutine (see “Call Nodes,” on page 58). Figure 3-4 shows the Frames level of a program that contains two subroutines: one for storing data collected in a file and one for displaying the date. Call nodes within the two program frames jump to the subroutines as needed.

Figure 3-4. Subroutines in a PPG program



Creating subroutines is the same as creating frames. Complete the following steps:

1. Select the **Create**⇨**Subroutine** command from the menu. The pointer changes into a rounded box labeled “SUB”.
2. Position the box where you want to create the subroutine, and then click the left mouse button. A frame box named “Subroutine 1” appears, and the arrow pointer reappears. (Subroutines are automatically numbered in the same sequence as frames; if you create three frames and then a subroutine, for example, the subroutine will be numbered 4.)

Since subroutines aren’t linked to other objects, their locations are unimportant. Normally, they are placed off to the side somewhere. To reposition a subroutine, drag it with the mouse.

3. To rename the subroutine, click on it with the **right mouse button** or select **Edit**⇨**Rename** from the menu to display the Frame Name dialog box. Enter the text you want displayed in the subroutine box, and select **Ok**.

If you're creating several subroutines, you can lock PPG into Create mode so that you don't have to choose **Create**⇨**Subroutine** each time. Just select **Create**⇨**Lock** before selecting **Create**⇨**Subroutine**. After you create a subroutine, the SUB pointer will remain visible so that you can click again to create another subroutine. When you're done, choose **Create**⇨**Unlock** or press **ESC** to exit Create mode and redisplay the arrow pointer.

To reference a subroutine from within a frame, use a Call node (see "Call Nodes," on page 58). When the subroutine has been executed, control continues with the next node after the Call node.

Creating and Using Links

Links are arrows that connect two frames or nodes, directing the program to the next step. A link pointing *to* a frame or node shows how it is accessed. A link pointing *away from* a frame or node shows where the program goes next.

Creating Links

To create a link, complete the following steps:

1. Select **Create**⇨**Link** from the menu. The pointer changes into a rounded box labeled "LINK".
2. Move the box to the frame or node you want to draw the link *from,* and click the **left mouse button**.

The link will be drawn using the middle of each object as an axis, regardless of the exact position of the pointer.

3. Move the box to the object you want the link to connect to, and click the **left mouse button** again to draw the link.

To draw a *jointed link* (a link with one or more bends), click the mouse with the pointer on the frame, move the LINK pointer to where you want the first joint to be, click the mouse again, and draw the next leg of the link. You can create up to seven joints. Click inside a frame or node to complete the link.

When creating several links, you can lock PPG into Create mode so that you don't have to choose **Create**⇨**Link** each time. Just select **Create**⇨**Lock** before selecting **Create**⇨**Link**. After you create a link, the LINK pointer will remain visible so that you can click again to begin creating another link. When you're done, select **Create**⇨**Unlock** or press **ESC** to exit Create mode and redisplay the arrow pointer.

Adjusting Links

To adjust an existing link, move the arrow pointer to the link's arrowhead or joint, and hold down the left mouse button. Drag the joint or arrowhead to a new position, and then release the mouse button.

If two or more links overlap, you can select them separately by moving the arrow pointer to a joint or arrowhead and holding down the left mouse button. The selected link appears dashed. To select the next link in the stack, press and hold down the left button again.

Deleting Links

To delete an existing link, drag its arrowhead to an area away from any frames or nodes, and then double-click the left mouse button.

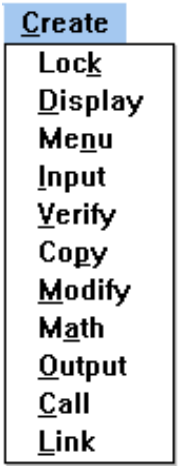
To delete a single link in an overlapping stack, click the left mouse button on the stack until the link you want to delete is selected (shown as a dashed line). Then drag its arrowhead to an empty area, and double-click the left mouse button.

Creating and Using Nodes

Each frame of a program flow chart contains its own set of nodes, which create, in effect, a sublevel flow chart. Every frame is assigned at least one node automatically: an Entry node, which shows the name of the frame. If the frame contains links to other frames, an Exit node for each link is also created automatically. You add and link your own nodes to define details for the frame.

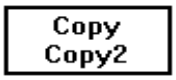
To go into the Nodes level of a frame, just double-click on it. You can also move to it with the mouse or the **TAB** key and then either select **View⇨Nodes** from the menu or press the **SPACEBAR**. When you're in the Nodes level, the **Create** menu lists each type of node available (see figure 3-5).

Figure 3-5. The Create menu in the Nodes level



To create a node, complete the following steps:

1. Select the type of node you want to create from the Create menu. The pointer changes into a rounded rectangle labeled with the name of that node. (For example, if you select **Create**⇨**Copy**, the pointer will look like the one shown at the left.)



2. Position the rectangle pointer where you want to create the node, and then click the left mouse button. The node box appears with two lines of text. The first line indicates the type of node it is (Display, Input, etc.). The second line repeats this text, followed by the node's number, which is assigned automatically according to the number of such nodes in the frame. (For example, if you've already created one Copy node, the second one you create will look like the one at the left.)

To reposition the node, move the pointer to it, hold down the left mouse button, and drag the node with the mouse. When the node is positioned where you want it, release the mouse button.

3. To change the second line of text in the node box, click on the node with the **right mouse button** (or select the node and choose **Edit**⇨**Rename** from the menu) to display the Node Name dialog box. Type the text you want displayed, and press **ENTER** or select **Ok**.
4. To set options and specify functions for the node, double-click on it with the **left mouse button** (or select it and press the **SPACEBAR**) to display the dialog box assigned to it. The dialog box that appears depends on the node's type. Set options and enter information as necessary, and then select **Accept**.

When creating several nodes, you can lock PPG into Create mode to save steps. Just select **Create**⇨**Lock**, and then either choose a type of node from the **Create** menu or click the **right mouse button** to cycle through all the different Create options. The pointer changes to indicate the type of node (or a link) that will be created. Create as many nodes as you like. When you're done, select **Create**⇨**Unlock**, press **ESC**, or click the **right mouse button** until the pointer shows "UNLOCK" and then click the **left mouse button**.

Each node you create requires at least one link to another node; some require two. Use the **Create**⇨**Link** command to draw links from one node to another (see "Creating and Using Links," on page 56).

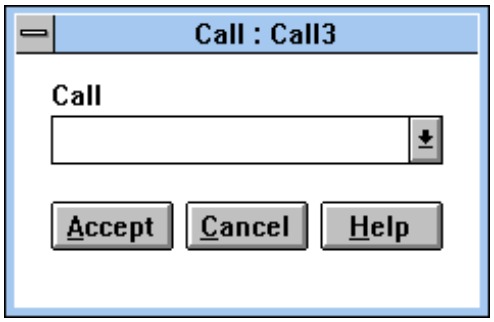
The following sections describe the types of nodes in alphabetical order.

Call Nodes

Call nodes execute a branch to a subroutine defined in the Frames level of the program. A subroutine contains nodes that perform a routine function, such as copying data to a file or verifying data. It can be called on from multiple locations in the program (with Call nodes), eliminating the need for duplication. By creating subroutines and referencing them with Call nodes, you can streamline your PPG program, saving both time and program size.

Figure 3-6 shows the dialog box associated with a Call node.

Figure 3-6. The dialog box for a Call node



Click on the **down-arrow button** to the right of the input box to display a list of all subroutines within the program. Select the subroutine you want to call, and then select **Accept**.

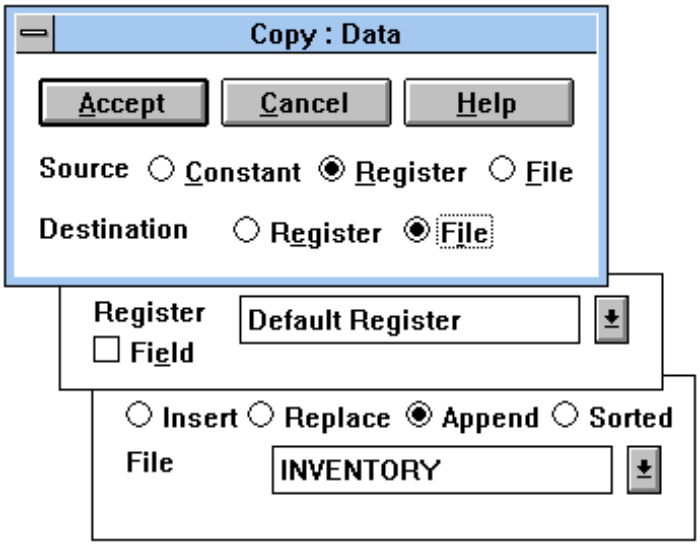
A call to a subroutine executes the specified subroutine and then returns to the node following the Call node.

Copy Nodes

Copy nodes are used to move data between registers and files. Collected data is often stored temporarily in a register until it is validated. Then a Copy node transfers the data into a file. A Copy node can also copy data from a portable file to a register, where it can be referenced or displayed. You can also use a Copy node to copy a constant value to a register or file or to copy data between files and between registers.

Figure 3-7 shows the dialog box associated with a Copy node.

Figure 3-7. The dialog box for a Copy node



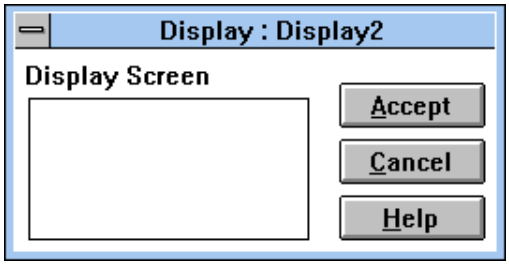
Source specifies the data to be copied—either a given constant or the contents of a given register or file. If you choose **Constant**, a subdialog box appears with a plain input box, in which you can enter a number or text string. If you choose **Register** or **File**, a subdialog box appears, in which you can specify a location (see "Registers," on page 71, and "Files," on page 73).

Destination specifies where the data will be copied—to a given register or file. Four radio buttons appear in the Register or File subdialog box. Select one to specify placement of data in the register (see "Using a Register as a Destination," on page 72, and "Using a File as a Destination," on page 74).

Display Nodes

Display nodes display text on the portable's screen. The dialogue box for Display nodes (see figure 3-8) contains a text-entry area the exact size of the portable's screen (16 characters by 4 lines). Use it to enter the display text. The specified text is placed beginning one line (row) below the current cursor position in the portable's virtual screen. (See the technical manual for your portable for information about the virtual screen.)

Figure 3-8. The dialog box for a Display node

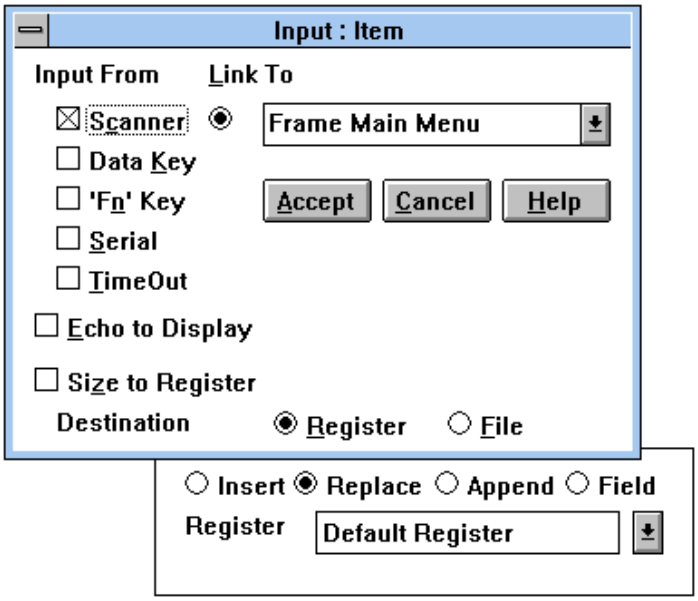


To use the portable's screen to present options that can be selected with the portable's function keys, use a Menu node (see "Menu Nodes," on page 64).

Input Nodes

Input nodes specify how the portable will receive data. You can use the dialog box for an Input node to indicate which sources of input (wand, data keys, etc.) you want to be accepted. You can specify a different program link for each type of source. For example, you could link any scanned (wand) input to a Verify node that makes sure it's a valid number and at the same time set up any function key input to return to the Main Menu. You can also specify a file or register to store the input data in, create a link for a timeout condition (no input received within a given number of seconds), and arrange for input data to be displayed in a specific position on the screen.

Figure 3-9. The dialog box for an Input node



Scanner allows data input from the bar code scanner. The program proceeds without waiting for the user to press the **ENTER** key.

Data Key allows data input from the portable's data keys (all the keys except the four function keys, **F1** through **F4**). The program waits for the user to press the **ENTER** key.

'Fn' Key allows data input from any of the function keys. There are four actual function keys, **F1** through **F4**, but you can also input **F5** through **F8** by pressing the **SHIFT** key once. For example, press **SHIFT** and then **F3** to enter **F7**. The program proceeds without waiting for the user to press the **ENTER** key.

Serial allows data, such as a downloaded pick list or portable program, to be input from the serial interface.

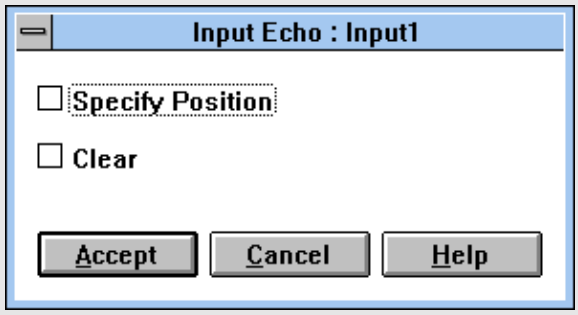
TimeOut specifies the number of seconds the portable will wait for data to be input. If no response is encountered within that time, the program moves on to the node specified by the **Link To** setting.

Link To specifies the frame or node to branch to. The drop-down list for this option names each node or frame the Input node links to. Each selected input type has its own Link To setting. To change a **Link To** setting for an input type, select the radio button to its right. Then select the frame or node from the **Link To** drop-down list.

Echo to Display displays the received data on the portable's screen. When this option is selected, a right-arrow button appears to its right. Click on the button to display the Input Echo dialog box, which you can use to set the position of the displayed data and specify clearing the line first (see "Echoing Input," on page 62).

Echoing Input

The Echo to Display option in an Input node dialog box instructs the program to display the input data on the portable's screen. When this option is selected, you can click on the right-arrow button to the right of the check box to display the Input Echo dialog box (see the figure below). This dialog box lets you set clearing and position options.



Specify Position lets you specify an exact starting position for input data on the portable's screen. When you select this check box, two input boxes appear: **Row** and **Col**. The default settings for both (0) start the display in the top-left corner of the screen. The rows and columns are numbered starting with 0; the first row is 0, the second is 1, and so on. You can specify rows 0 through 3 and columns 0 through 15.

Clear removes existing data from the line on which the input data will be displayed. When this option is selected, two radio buttons appear: **To EOL** and **Count**. Select **To EOL** to clear from the cursor position (as specified above) to the end of the current line. Select **Count** to clear only from the cursor position to a given number of characters forward. Selecting **Count** displays an input box in which you can enter the number of characters to clear.

The echoed input is left on the screen until you display something else.

You can also use two Output nodes to redisplay data on the screen. The first Output node should move the cursor to a blank line of the screen for displaying the input data. The second Output node can then redisplay the contents of the register used to store the input. (For an example of this, see steps 9 and 10 on page 47.)

Size to Register saves the number of characters input in the specified register. Selecting this option opens a list box that you can use to define a register (see "Registers," on page 71). Be sure to use a different register from the one used to store the data. (An "Input Size" register is predefined for your convenience.) For serial input with a file as the destination, the number of records in the file is returned as the size in the specified register.

Destination specifies the destination in which to store the input data. The default setting, Default Register, stores the data in a temporary register that is overwritten with each new input. A Copy node is then required to copy data from that register to a file after each new input. To specify a different register, choose one from the drop-down list, or type in the name of a new register you want to create.

Use the radio buttons to specify placement of the data in the register (see “Using a Register as a Destination,” on page 72). To store the data in one field of the register, select the **Field** radio button, specify or define a template, and select the field (see “Creating a Template,” on page 74).

To store the data in a file, select the **File** radio button, and then choose a file name from the drop-down file list or type in the name of a file you want to create. By default, the data is appended to the specified file. However, you can choose to insert the data before a given record in the file, replace a given record, or insert the data in alphabetic or numeric order (see “Files,” on page 73).

Math Nodes

Math nodes perform basic mathematical operations on the contents of a given register. For example, you could multiply the contents of the default register by 3 and store the results in a register called Triple. Rather than supplying a constant (such as 3), you could specify another register that contains the number you want to multiply, add, subtract, or divide by.

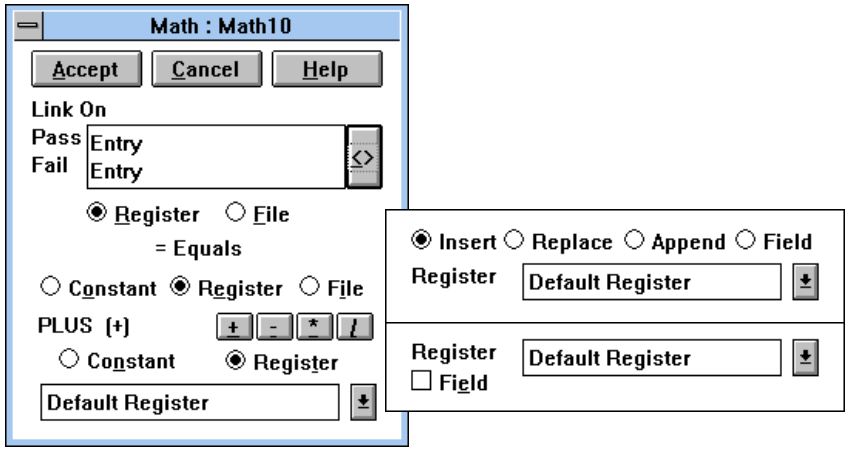
The format of the math function is as follows:

Register | *File* = *Constant* | *Register* | *File* + | - | / | * *Constant* | *Register*

The results of the math operation must be within the range of -999,999,999 through 999,999,999 and are always rounded to the nearest integer.

Figure 3-10 shows the dialog box for a Math node.

Figure 3-10. Dialog box for a Math node



Link On specifies the node to branch to if the math operation passes and where to branch to if it fails. A math operation will fail only if you attempt to divide a value by zero or operate on a nonnumeric value. The **Pass/Fail** settings are assigned automatically according to links you've created. You can't type in a different link. You can, however, click on the switch button to reverse the **Pass/Fail** settings. The **Fail** link is created automatically.

Register/File specifies where the results of the math operation will be stored—in either a field, register, or file. An appropriate subdialog box appears for the option you select.

Constant/Register/File specifies the value or location of the value on which you want to operate. If you choose **Constant**, you can use the displayed input box to enter a value. If you choose **Register** or **File**, use the displayed subdialog box to specify the exact location.

+ - * / lets you select the math function you want by clicking on one of the four operator buttons. Your selection will be described to the left of the buttons.

Constant/Register specifies the value or register containing the value to be added to, subtracted from, divided into, or multiplied by the original value. Use the displayed subdialog box to specify the value or register location.

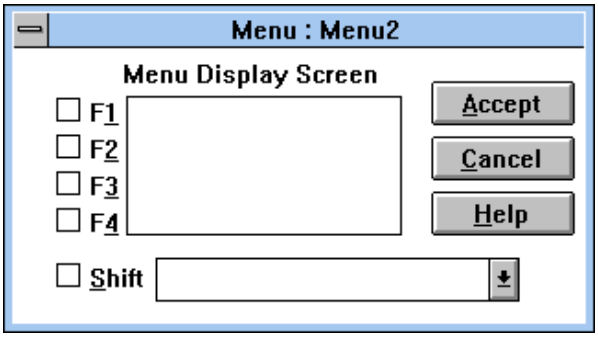
For details on specifying register and file options, see "Registers," on page 71, and "Files," on page 73.

Menu Nodes

A Menu node presents a group of options on the portable's screen and allows the user to choose one of those options by pressing a function key. The function keys can be used with or without the **SHIFT** key, allowing for a total of eight selectable menu options.

Figure 3-11 shows the dialog box for a Menu node.

Figure 3-11. Dialog box for a Menu node



Menu Display Screen represents the portable's screen, which is 16 characters wide and 4 rows deep. Enter the menu text here, including any title or prompt you want to display. Each line of the screen is associated with a portable function key, although you need to activate only the keys you want to use.

The **F1–F4** check boxes activate or deactivate the function keys associated with each line of the screen. If you want a function key to execute an option on the menu, select it here. A radio button appears next to each selected check box, letting you use the drop-down list to set a node link for each option.

The **Shift** check box activates the Shift mode for each of the four function keys. When it is selected, options you set affect the function keys used with the portable's **SHIFT** key (**F5–F8**). When you deselect this check box, the settings for the standard **F1**–**F4** keys reappear.

Any function keys not activated in the Menu node dialog box will have no effect when pressed.

The **Link To** drop-down list is not labeled in the dialog box. It includes the name of each node that the Menu node is linked to. Use it to connect a node link with a specific function key. Select the check box next to the function key, select the function key's radio button, and then select the node you want linked to the function key from this list. Repeat for every function key you want to activate.

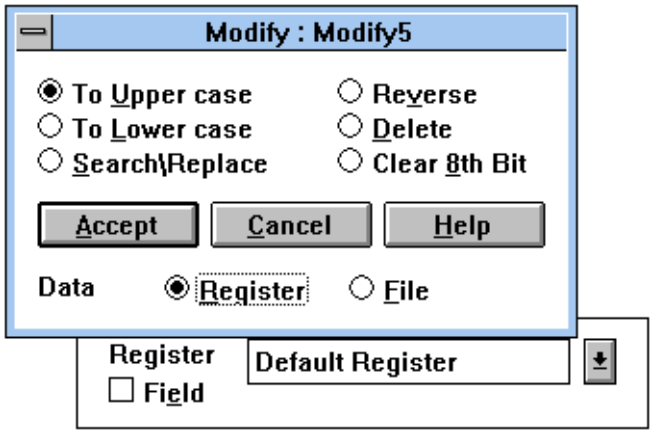
If the Menu node is not yet linked to other nodes, this list will be empty. Exit the dialog box, create the links, and then return to the dialog box.

If you simply want to display information on the portable's screen, use a Display node instead of a Menu node (see "Display Nodes," on page 60). To execute only one action regardless of which function key is displayed, use a Display node in conjunction with an Input node (see "Input Nodes," on page 60).

Modify Nodes

Modify nodes let you change the contents of a given register or file. You can switch text to all uppercase or all lowercase, reverse the order of data, or delete data. You can also perform a search-and-replace operation on data and clear the eighth bit of data. Figure 3-12 shows the dialog box for a Modify node.

Figure 3-12. The dialog box for a Modify node

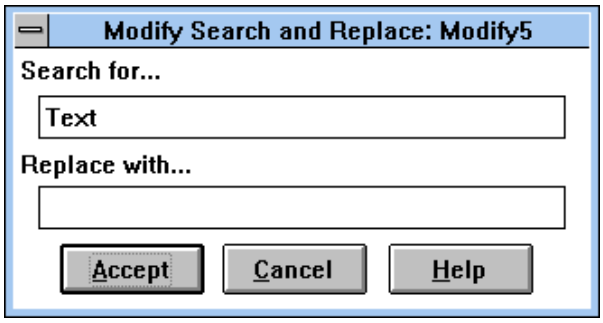


To Upper case changes all lowercase characters in the source string to uppercase.

To Lower case changes all uppercase characters in the source string to lowercase.

Search\Replace replaces all instances of a given string with a second given string. When this option is selected, a right-arrow button appears next to the option. Click on it to display the Modify Search and Replace dialog box (see figure 3-13). Enter the string you want to search for in the **Search for…** input box and the string you want to replace it with in the **Replace with…** input box. Then select **Accept**.

Figure 3-13. The Modify Search and Replace dialog box



Reverse reverses the order of data in the specified register. For example, if the register value were 123456, this option would reverse the order of characters in the string to 654321.

Delete erases the contents of the specified register (or register field) or file (or record of a file).

Clear 8th Bit ensures that the specified data is in seven-bit ASCII format. If the data is stored in eight bits, this option clears the eighth bit. (The only case in which this might be necessary is with a file that has been downloaded from a PC.)

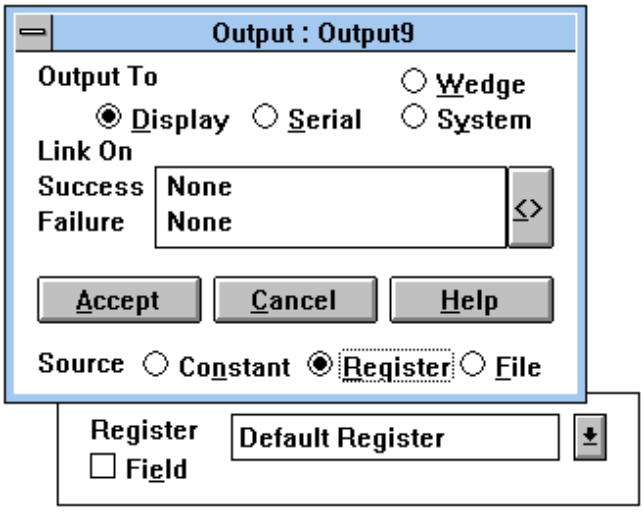
Data specifies the location of the data to modify. If you choose **Register**, select a register from the displayed Register list box. To modify only one field of the register, select the **Field** check box and select the template and field name from the displayed list boxes. (See "Registers," on page 71.) If you choose **File**, select the file name from the displayed list. Select the Record check box to modify a specific record or field of the file. (See "Files," on page 73.)

Output Nodes

Output nodes send data to the portable's display, to the serial port, or to the portable's system software. You can send a defined constant or the contents of a register or file. When sending data to the system, you can use special commands that sound a beep, set the system date or time, or reconfigure the portable. You can also send commands to the display to reposition the cursor or erase the display.

Figure 3-14 shows the dialog box for an Output node.

Figure 3-14. The dialog box for an Output node



Output To specifies the channel over which data will be sent. The **Display** setting writes the data on the portable's screen, starting at the current cursor position. **Serial** sends the data over the portable's serial port to a connected PC (to upload a file, for example). **System** sends the data to the portable's operating system. This option is used with special commands (entered as constants) that sound a beep, set the system date or time, or position the cursor on the screen (see "Outputting Commands to the System," on page 68). The **Wedge** option is for a PT 2000 portable only. It turns the portable into a "keyboard wedge," sending data from the PT 2000 to a connected PC as if it were being typed on a keyboard.

Link On specifies the node to branch to if the output function is successful and where to branch to if it fails. The **Success/Failure** settings are assigned automatically according to links you've created. You can't type in a different link. You can, however, click on the **switch button** to reverse the **Success/Failure** settings. The **Failure** link is created automatically.

Source specifies the data or command to be transmitted (**Constant**) or the register or file containing the data. (See "Registers," on page 71 and "Files," on page 73.)

Verify Nodes

Verify nodes test data in a register or file to see if it's a certain type (ASCII, numeric, or alphabetic). They can also verify that the data matches a given constant, matches the contents of a register, or falls within a given numeric or alphabetic range. Usually a Verify node links to one node if the data passes the test and to another node if it doesn't. For example, a Verify node might check to see if the value scanned is numeric. If it is, the Verify node might branch to an Output node that sends the value to a file; otherwise, it might display an error message.

Outputting Commands to the System

You can use an Output node to send special commands to the portable's display or operating system. These commands, defined in the table below, set the system's internal time and date, sound a beep, reposition the cursor on the portable's screen, and clear data from a line of the screen.

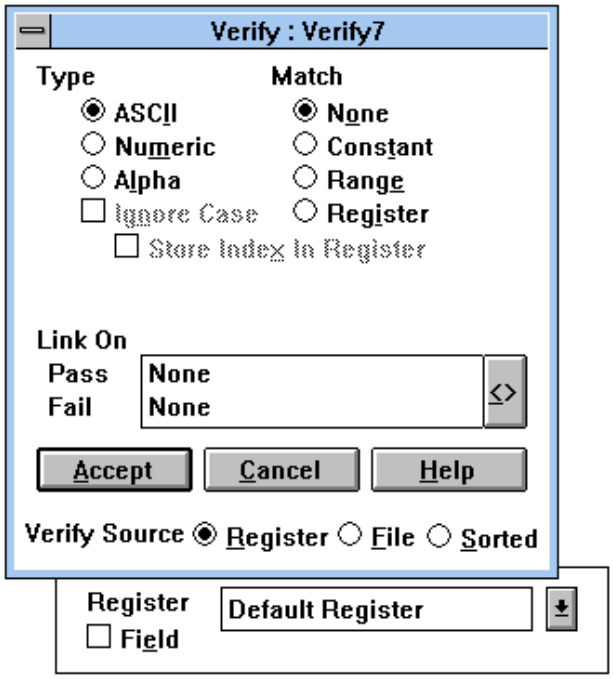
Command	Effect
System Commands	
%-	Displays a prompt on the portable's screen asking the user to enter a new time in the format *hh:mm:ss* (military time) or *hh:mm:ss am/pm*, depending on the portable's configuration. The portable's internal clock is then set to that time.
%.	Displays a prompt on the portable's screen asking the user to enter a new date in the format *mm:dd:yy* or *dd:mm:yy* (depending on the portable's configuration). The portable's internal calendar is then set to that date.
.-	Sounds a low beep.
.+	Sounds a high beep.
Display Commands *TIP* The **\x1B** sequence represents the ESC character. Type it exactly as shown here.	
\x1B[*r*;*c*f	Moves the cursor *r* number of rows down and *c* number of columns to the right within the currently displayed window.
\x1B[K	Erases all text from the cursor position to the end of the current line.
\x1B[*r*;*c*H	Positions the cursor at the row given as *r* and the column given as *c* within the 25-line-by-80-character virtual screen.
\x1B[2J	Erases all text on the portable's screen and returns the cursor to the "home" position (the upper left corner).
\x1B[nA	Moves the cursor up one row.
\x1B[nB	Moves the cursor down one row.
\x1B[nC	Moves the cursor one column to the right.
\x1B[nD	Moves the cursor one column to the left.

There are many other special commands you can output to the system—to set baud rate, for example, or to change the maximum length of bar codes to be read. These commands are covered in the portable's technical manual as parameters you can set by scanning bar codes, but you can also issue the commands to the system by entering the code value in an Output node.

NOTE For important information about linking Verify nodes, see the tip on page 25.

Figure 3-15 shows the dialog box for a Verify node.

Figure 3-15. The dialog box for a Verify node

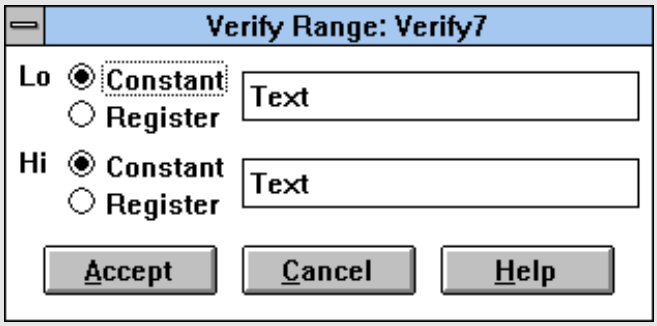


Type verifies that the tested data is ASCII (hex values 00 to 7F), numeric (hex values 30 to 39), or alphabetic (hex values 40 to 5A and 60 to 7A). Numeric values include the characters + (plus), - (minus), and . (period). ASCII values include both numeric and alphabetic characters; if it doesn't matter to you whether the data is numbers or letters, use the **ASCII** setting.

Match specifies the data to be tested against. The **None** setting requires no match; it tests only on the basis of type. If you select any of the other three radio buttons, a **right-arrow button** appears next to the option. Click on it to display a dialog box for entering a constant, range, or register name. (See “Specifying a Range to Match,” below, for information on setting up a range. See “Registers,” on page 71, for details on specifying a register location.)

Specifying a Range to Match

When verifying data, you can use the **Match Range** setting to verify that a number falls within a given range or that a text string falls within a given alphabetic range. When you select the **Range** radio button for the **Match** option, a **right-arrow button** appears next to the option. Click on it to display the Verify Range dialog box (see the figure below). Use this box to define both the low and high values of the range.



For the lowest and highest values in the range, you can specify either a constant or the contents of a given register. To specify a constant, select the **Constant** radio button and type in a number or text string. To specify a register, select the **Register** radio button and select a register name from the drop-down list. Select **Accept** to return to the Verify Node dialog box.

Ignore Case verifies the data match regardless of capitalization. If you want the data to be case specific, don't select this option.

Use **Store Index In Register** when you're verifying data in a file. This option stores in a register the number of the first record in the file that passes the verification. (If there is no match, it stores the position of the last record.) When this check box is selected, a register list box appears. Select a register name from the list, or type in an unlisted name to create a new register (see "Registers," on page 71). This option is disabled when the **Verify Source** option is set to **Register**.

Link On specifies the node to branch to if the verify function is successful and where to branch to if it fails. The **Pass/Fail** settings are assigned automatically according to links you've created. You can't type in a different link. You can, however, click on the **switch button** to reverse the **Pass/Fail** settings.

Verify Source specifies the location of the data to be verified—either a register or a file. The **Sorted** setting uses a binary search algorithm to speed up file searches. This option works only with presorted files. Use the displayed subdialog box to specify the exact register or file (see “Using a Register as a Source,” on page 71, and “Using a File as a Source,” on page 73).

Controlling Data Flow

So far, there has been a lot of focus on program control and how the portable’s program will work from the user's viewpoint. Another essential piece, however, is how data is handled by the program. Since the program's result is a file of collected data, it's important to spend some time thinking about the purpose of this file and how you want it organized. You may also want to work with data files that are downloaded into the portable or examine portions of collected data.

Three important tools can help you control the flow of data:

- *Registers* store data temporarily. When you scan or enter a string of data, it is usually placed in a register before it is copied into a portable file. You can also use registers to store user response to a prompt, the index of a record in a file, and so on.
- *Files* hold data in the portable until it can be uploaded to a PC. Usually after input data is verified, it is inserted in a portable file. The file expands as more data is added. Files can also be used to hold database information downloaded from a computer. This information can then be used to verify scanned data or for other purposes.
- *Templates* let you combine data stored in different registers or break down data in a single register into *fields*. You can use them to set up *records* in a file so that the data can easily be transferred to a database or spreadsheet file. You can also use them to access portions of data in a register.

The following sections describe how to specify a register in which to store data or copy data from, how to specify a source or destination file for data, and how to create a template for breaking down or combining data. The last two sections give examples of using registers, templates, and files to control data flow.

Registers

A *register* is a temporary holding place for data. Whenever a data source or destination is requested in a node dialog box, **Register** is given as an option. When you select it, the Register subdialog box appears so that you can specify an existing register or create a new one.

USING A REGISTER AS A SOURCE When you choose **Register** as the setting for a source option, the subdialog box shown in figure 3-16 appears.

Figure 3-16. The Source Register subdialog box

Click on the **down-arrow button** next to the **Register** list box to display a list of existing registers. To specify one of these registers, just select it from the list. To create and specify a new register, type a name in the list box.

To specify only a given field of the register, select the **Field** check box. The **Template** and **Field** list boxes appear (see "Specifying a Register Field," on page 73).

USING A REGISTER AS A DESTINATION When you choose **Register** as the setting for a destination option, the Register subdialog box includes options for data placement (see figure 3-17).

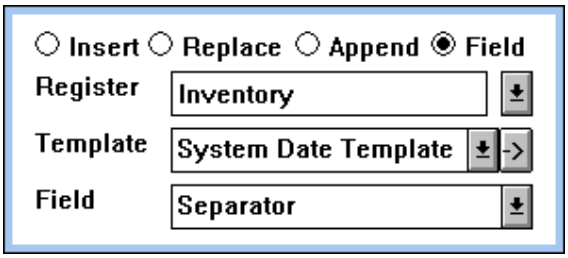
Figure 3-17. The Destination Register subdialog box

Specify the register name by selecting it from the drop-down list or typing it in. Then select one of the following radio buttons:

- **Insert** places the data at the beginning of the register, before any existing data.
- **Replace** replaces any data previously stored in the register.
- **Append** adds the data to the end of the register, after any existing data.
- **Field** stores the data in a specified field of the register (see the following section).

SPECIFYING A REGISTER FIELD If you select the **Field** option in either Register subdialog box, the box changes to include **Template** and **Field** list boxes (see figure 3-18).

Figure 3-18. Template and Field list boxes



Select the template you want to use from the **Template** drop-down list, and then select the field. You can use the right-arrow button at the right of the **Template** list box to alter or create templates (see “Creating a Template,” on page 74).

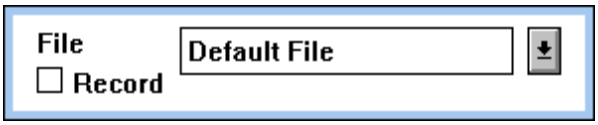
Files

Portable files are used to store data that has been either input via the portable’s wand or data keys or downloaded from a PC file through the serial port. Each entry in a file is called a *record*, and the records in each file are numbered, with 1 as the first record.

There are two types of file settings in portable dialog boxes. *Source file* settings specify a file or record in a file to be read from. *Destination file* settings determine a file or record to be written to.

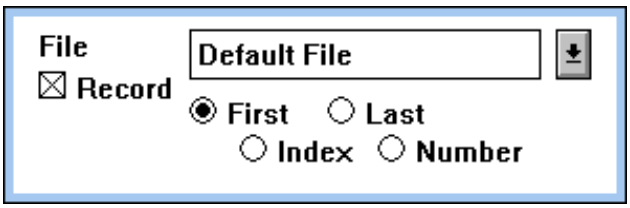
USING A FILE AS A SOURCE When you select **File** as the setting for a source option, the subdialog box shown in figure 3-19 appears.

Figure 3-19. The Source File subdialog box



Select the name of the file you want from the drop-down list, or type in a name to create a new file. To specify only a certain record of the file, select the **Record** check box. The subdialog box then expands, as shown in figure 3-20.

Figure 3-20. The Record Selection options



Select the **First** or **Last** radio button to specify the first or last record in the file. To specify a record number, select **Number** and enter the number in the input box that appears. To use a record number stored in a register, select **Index** and use the displayed **Register** list box to specify the register (see "Using a Register as a Source," on page 71).

USING A FILE AS A DESTINATION If you choose **File** as the setting for a destination option, the dialog box shown in figure 3-21 appears.

Figure 3-21. The Destination File subdialog box

Choose the file you want from the drop-down list, or enter a file name in the list box. Then select one of the following radio buttons:

- **Insert** places the data before a given record. When this option is selected, further radio buttons appear (**First**, **Last**, **Index**, and **Number**) that let you specify a certain record in the file. (These options are described in the preceding section, "Using a File as a Source.")
- **Replace** replaces a given record. Use the displayed radio buttons to specify the exact record.
- **Append** adds the data to the end of the existing file.
- **Sorted** inserts the record of data into the file based on ascending ASCII value. Use this to insert records into a file that has already been sorted to maintain the proper order of the records in the file.

Creating a Template

A *template* is a structure that you can define and use to alter the way in which collected data is stored.

The most common use of templates is to take data from two or more registers and tie them together in a single register. This allows you to collect and store more than one type of information. For example, your program could ask the user to enter first a location code for an item and then the item number. The template would combine each set of values in a register, and the value pair could then be copied to a file as fields in a single record. Data in the file would be arranged either in fields of a fixed size, as in the following:

Field 1	Field 2
2348	493848
48	393948
8	293832
29	832928
185	392038
28	282930

or with delimiters separating variable-length fields in the record, as in the following:

2483, 493848
48, 393948
8, 293832
29, 832928
185, 392038
28, 282930

Templates can be used only on registers, not on records in files.

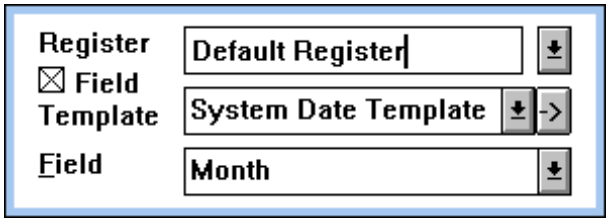
The data file can then easily be translated for use by a database or spreadsheet program. The first value in each record would go into a Location field, the second value would go into an Item Number field, and the program would pair the values appropriately.

Another use of templates is to break down data stored in one register into two or more register fields (for example, to strip out the first section of a code).

To create a template, complete the following steps:

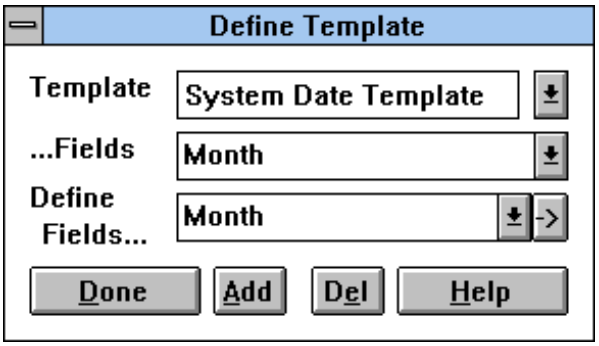
1. Double-click on an Input node (or any node that has a **Register** option), and select **Register** as an option setting.
2. Specify a new register for storing the data, or just use the **Default Register** setting.
3. Select the **Field** check box next to the **Register** list box. The subdialog box expands, as shown in figure 3-22.

Figure 3-22. The expanded Register subdialog box



4. Click on the **right-arrow button** to the right of the **Template** list box to display the Define Template subdialog box (see figure 3-23).

Figure 3-23. The Define Template subdialog box

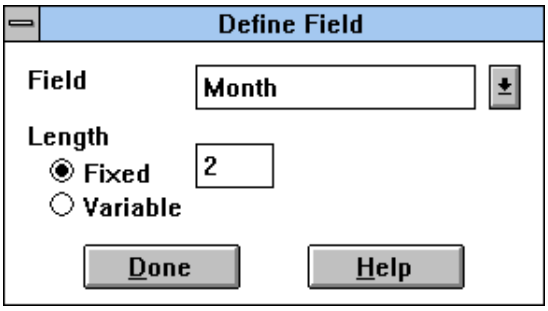


5. In the **Template** input box, enter the name you want to give the new template.

To modify an existing template, choose a name from the drop-down list.

6. The **Fields** list box includes the names of all fields assigned to the template. (There are none at this point.) The **Define Fields** list box lists all defined fields you can assign to the template. It includes system-defined fields, such as **Month** and **Hours**. To add your own fields to the **Fields** list, click on the **right-arrow button** to the right of the **Define Fields** list box. The Define Field subdialog box appears (see figure 3-24).

Figure 3-24. The Define Field subdialog box



7. In the **Field** input box, enter the name you want to give the first field for the template.
8. If you want the fields to be arranged in columns, select the **Fixed Length** radio button and enter the desired column width (in number of characters). This number should be at least the maximum number of characters to be entered in the field—more if you want to create space between the columns.

   To allow for variable-length entries, with fields separated by a delimiter (such as a comma), select the **Variable Length** radio button and enter the character you want to use as a delimiter.

9. Repeat the last step for each field you want to define. When you're done, click on the **Done** button to return to the Define Template dialog box.

10. Select the **down-arrow button** next to the **Define Fields** list box and you'll see your new fields added to the list. Select the first field you want in your template. With that field displayed in the input box, select the **Add** button to copy it to the **Fields** list above.

11. Repeat step 10 for each field you want included in the template. Add the fields in the order in which you want them to be arranged in the data records (although you can input data in the fields in any order). When you've added all the fields you want, select the **down-arrow button** next to the **Fields** list box to display the list, and then select **Done**.
12. Back in the Register subdialog box for the Input node, select your newly defined template from the **Template** drop-down list.
13. From the **Field** drop-down list, select the field that data for that particular node should be stored in or retrieved from.
14. For each Input node handling data for one of the template's fields, display the Input node dialog box, set the **Destination** option to **Register**, and select the **Field** check box. Then select the template from the drop-down list and select the field you want that data to be stored in. If you specified a particular register for storing the template data (in step 2), use that same register setting here.

Once you've created a template, it is added to the template drop-down list and you can use it with any register.

Modifying a Pick List

Suppose you run a small TV-repair shop and you keep track of your parts inventory on a PC in your shop office. Instead of running to your office computer each time you use a part, you want to be able to use the portable to adjust your inventory during the day and then update your PC inventory file each night.

You need to create a portable program that will download the latest inventory file from your PC as a “pick list” and modify it as necessary to keep the inventory current. Each time you take a part off the shelf, you would scan its part-number label. The portable’s program would then subtract 1 from the quantity of items for that part number in the pick list. At the end of the day, you could use an upload function in the portable’s program to copy the adjusted data file back to your PC.

You could use registers, files, and templates to accomplish this by completing the following steps:

1. Use an Input node to download the pick list from the PC to a portable file.
2. Use another Input node to store a scanned part number in a register named Part Number.

3. Since templates cannot be used directly on files, you can create a second file that contains only part numbers. To do this, mark the end of the file by appending it with a text flag, such as END. Then copy the first record in the file into a register. Use a template in a Copy node to copy the part-number portion of the register into its own file and the rest of the data into another file. Continue until the last record (named END) is reached.

Another way to achieve this is by downloading two files separately.

4. Use a Verify node to search through the new part-number file for the number stored in the Part Number register. Store the index of the matched record in a register named Index.
5. Use the number stored in the Index register along with another Modify node to pinpoint the corresponding record in the original pick list.
6. Use a Copy node to access the quantity field for that record and store it in a register named Quantity.
7. Use a Math node to subtract 1 from the value in the Quantity register.
8. Use a Copy node to copy the modified value back into the pick list in its original position.

Breaking Down Data in a Register

Now suppose that you own a catalog business. As you ship packages out, you scan a label that includes information about the destination. The first character of each label identifies the destination region: North, West, South, or East. You want to alter your portable program so that the data is stored in four different files, one for each region.

You need to create a template that breaks down the scanned code into two fields, one for the region character and one for the rest. The template should then examine the region field to determine which file the scanned data should be copied to—North, West, South, or East.

To create this template, complete the following steps:

1. Create a Verify node that uses a template to check whether the character in the Region field is N and, if it is, proceeds to a Copy node that copies the contents of the input register to a file called North.
2. Create a Verify node that checks whether the character is W and, if it is, copies the input code to a file called West.
3. Create two more Verify and Copy node pairs to copy data labeled South and East to the appropriate files.

Editing a Flow Chart

After you've created a program flow chart, you can modify it at any time. You can move and add frames and nodes, adjust links, and change options in node dialog boxes. You can use the following commands in the Edit menu to make changes to a flow chart:

The keystrokes given in parentheses allow you to use the menu commands without going through the Edit menu. (For complete information about keyboard shortcuts, see your Microsoft Windows user's guide.)

- **Cut** (**SHIFT+DELETE**) removes the selected node or frame from the flow chart and stores it in the Windows Clipboard. Any links to the frame or node are removed as well.
- **Copy** (**CTRL+INSERT**) copies the selected node or frame to the Clipboard without removing it from the flow chart.
- **Paste** (**SHIFT+INSERT**) inserts the node or frame stored in the Clipboard in the upper left corner of the screen.
- **Delete** (**DELETE**) removes the selected node or frame (and its links) without storing it in the Clipboard.
- **Rename** displays the Name dialog box for the selected node or frame so that you can rename it.

Cutting, Copying, and Pasting

You can use the **Cut**, **Copy**, and **Paste** commands to move and copy parts of a flow chart from one frame to another or from one program to another. These commands operate on frames and nodes just like they do on text or graphics in other Windows applications.

To move an object from one frame or program to another, select it and choose **Edit**⇨**Cut**. To copy an object, select **Edit**⇨**Copy**. Then go to where you want the cut or copies object inserted and choose **Edit**⇨**Paste**. The object is pasted in the top left corner of the window, but you can drag it with the mouse to reposition it.

In the Nodes level, you can select more than one object by drawing a box around the objects with the mouse. You can then cut or copy all the objects in the box at one time and place them somewhere else. You can also drag all the boxed objects with the mouse.

Fields and templates cannot be moved or copied between programs.

Deleting Nodes and Frames

To delete a node or frame, simply select it and choose **Edit⇨Delete** or press the **DELETE** key. The object is removed along with any links to or from it.

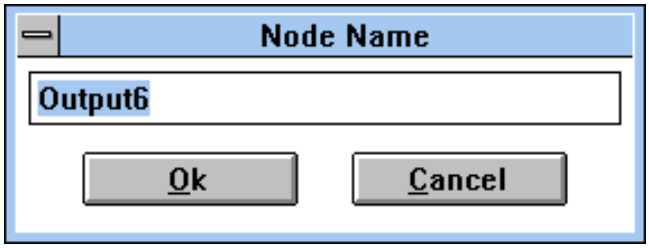
There's no "undo" command to reverse a deletion you make accidentally. For that reason, it's a good idea to use **Cut** instead of **Delete** to remove nodes and frames. That way, if you delete something by accident, you can use **Paste** to bring it back.

Renaming Nodes and Frames

When you create a node or frame, it is automatically named Node# or Frame#, where # is the number of nodes in the frame or the number of frames in the program. It's helpful to give a node or frame a more descriptive name so that its purpose in the program is easily identified.

To rename a frame or node, move the pointer to it and click the right mouse button, or select the frame and choose **Edit⇨Rename**. The Frame Name or Node Name dialog box appears, showing the currently assigned name (see figure 3-25). Type the new name in the input box, and select **Ok** or press **ENTER**. The new name then appears in the frame or node.

Figure 3-25. The Node Name dialog box



General Options

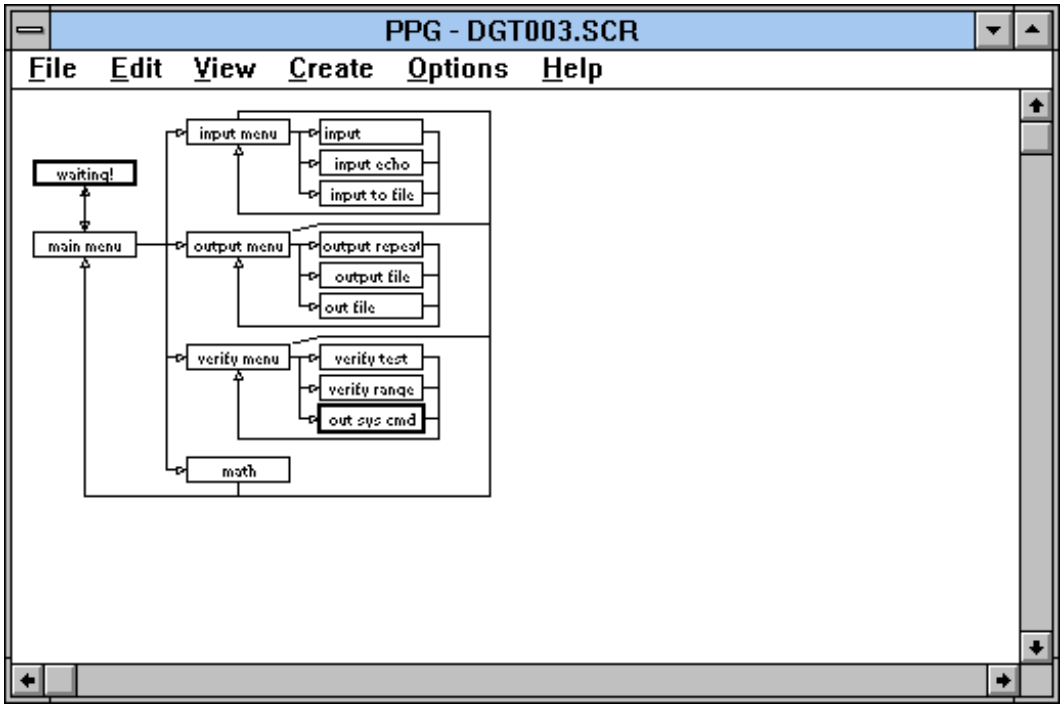
You can use menu commands in PPG to

- Reduce the size of the flow chart so that you can see more of it on the screen at once.
- Change the fonts used to display text in the flow chart.
- Adjust the grid used for placing nodes and frames.
- Change the size of node and frame boxes.
- Specify the type of bar codes you want the program to handle.
- Indicate the frame you want to use as the start of the program.

Switching Display Size

If your flow chart is larger than the PPG window, you can use the scroll bars and cursor keys to scroll different areas into view. You can also use the **View⇨Zoom Out** command to reduce the size of the flow chart so that more of it will fit in the window at once (see figure 3-26). Once you've used this command, it is replaced by a **Zoom In** command in the **View** menu; select this command to return the flow chart to its original size. When you choose **Zoom In**, the selected node or frame is centered on the screen. This offers an easy way to move around a large program.

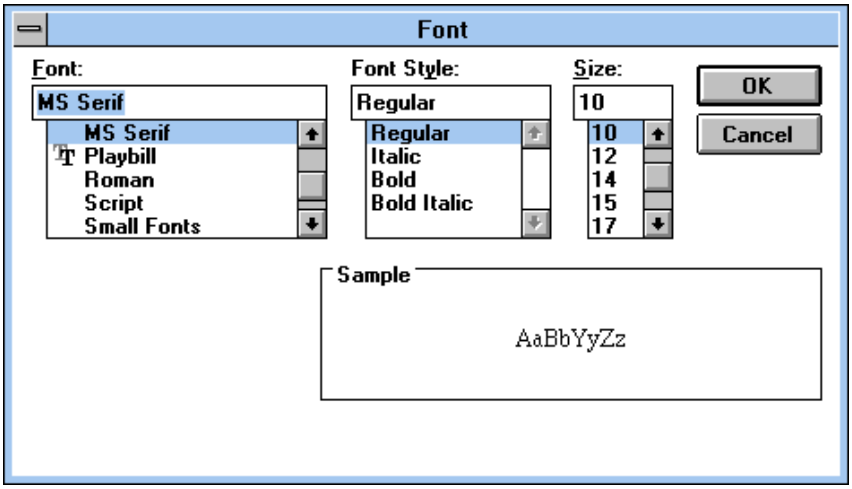
Figure 3-26. A "zoomed out" flow chart



Changing Fonts

You can change the font, font style, and point size of text displayed in your flow chart. Select **Options**⇨**Font** to display the Font dialog box (see figure 3-27).

Figure 3-27. The Font dialog box



From the **Font** list box, select the font (typeface) you want to use. Styles for that font are listed in the **Font Style** list box. To use **Bold**, **Italic**, or **Bold Italic** style, select it from the list. Use the **Size** list box (or type an unlisted size) to specify the size of the text as displayed on your screen in regular display mode (not zoomed out). Text in the sample box changes to reflect your selections. When you've made the selections you want, click **OK**.

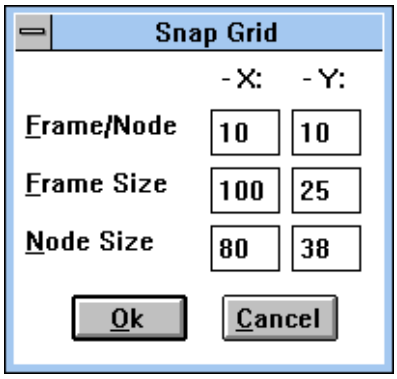
The new font affects *all* text in the flow chart, not just the selected node or frame.

Adjusting the Grid and Box Size

You might have noticed that when you move a node or frame, it sometimes shifts a bit to fall into place. Underlying the flow chart is an invisible grid that determines where nodes, frames, and links can be placed. When you create or move an object, it automatically "snaps" to the closest grid intersection. With the **Options**⇨**Grid** command, you can adjust the distance between lines in this grid to increase or decrease the precision with which you can place objects on the screen. You can also change the size of node and frame boxes with this command.

Figure 3-28 shows the Snap Grid dialog box, which appears when you select **Options**⇨**Grid**. There are two settings for each option: **X** and **Y**. The **X** column sets options for the horizontal axis. This axis determines the width of boxes and placement of objects horizontally. The **Y** setting determines box height and placement of objects vertically. The grid is measured in units called *pixels*, the exact size of which varies from screen to screen. (The average is 96 pixels per inch for a 14-inch screen in VGA mode.)

Figure 3-28. The Snap Grid dialog box



To be able to place objects very precisely on the screen, decrease the space between grid lines by lowering the **Frame/Node** values. To make it easier to line objects up on the screen, increase these values, expanding the space between grid lines. If you're finding that some of the text in your nodes or frames is getting cut off, you may want to increase the box size or decrease the font size.

When you're done, select **Ok** to exit the dialog box. All objects in the current flow chart are affected immediately.

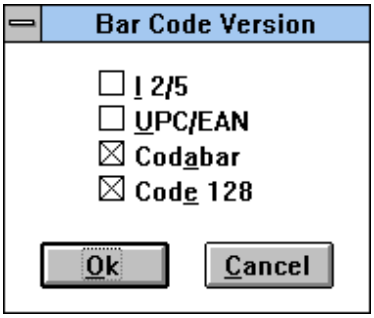
The grid map for links is automatically set to half of whatever the **Frame/Node** grid is set to. For example, with the default **Frame/Node** setting of 10/10, the link grid is set to 5/5.

Specifying Bar Code Type

There are several types of bar codes that can be generated by bar code printing programs, including Code 39, I 2/5, UPC-EAN, Codabar, and Code 128. (UPC-EAN codes are the standard codes found on consumer items.) Percon portables can always read Code 39 bar codes, but you must specify which other code types you want to decode.

To specify the types of bar codes that a program can read, select **Options⇨Set Bar Codes** and choose the symbologies you want to be able to decode from the Bar Code Version dialog box (see figure 3-29).

Figure 3-29. The Bar Code Version dialog box



The number of types that can be decoded is limited by your portable's memory. Possible combinations are:

I 2/5, Codabar, Code 128
I 2/5, UPC/EAN
I 2/5, Codabar
I 2/5, Code 128
UPC/EAN, Codabar
UPC/EAN, Code 128

When you've selected the symbologies you want the portable to be able to decode, select **Ok**. If the selected symbologies require more memory than the portable has available, a message box appears. Deselect one or two symbologies and try again.

The bar code settings are stored with the current flow chart file, and so they are in effect each time you work with that file.

Setting a Starting Place

A program's starting place is the frame with which the program begins. By default, the portable's program starts with the first frame that was created. To start the program with a different frame, use the **Options⇨Set Start** command to set a starting place.

When you choose **Options⇨Set Start**, the mouse pointer changes to a rounded box labeled "START". Move it to the frame you want the program to start with, and click the **left mouse button**. The specified frame appears with a double-line border.

The **Set Start** command is used only for frames. It is dimmed in the Nodes view and cannot be selected.

Working with Program Source Files

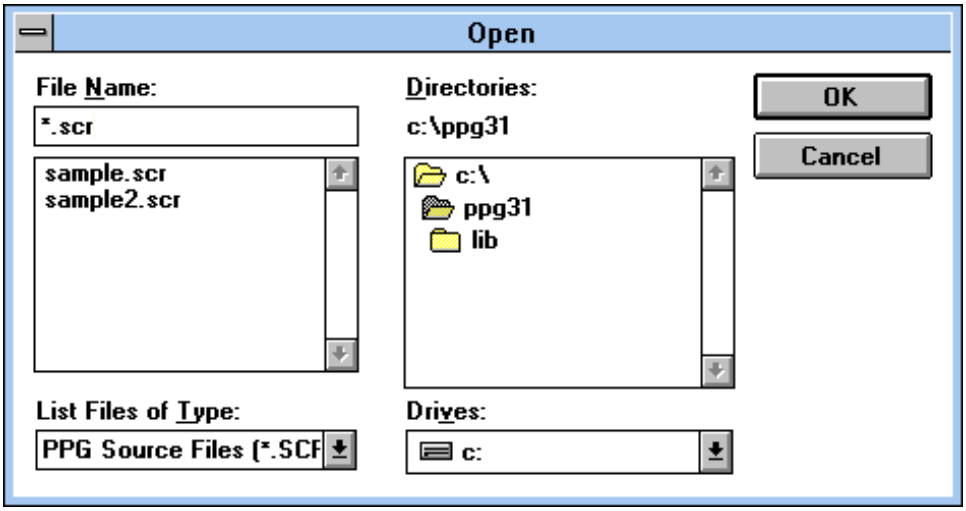
Like most software programs, PPG stores data in files. To save a program flow chart, you must copy it into a file. You can then call it up and modify it at any time. Commands on the PPG **File** menu let you open an existing file, save a file, close a file, start a new file, and print a file.

Don't confuse PPG program *source files* with those used to store data in the Percon portable. The portable has its own type of files used for storage (see "Controlling Data Flow," on page 71); although they can be transferred to a DOS file on your PC, they are not directly compatible.

Opening a File

To open an existing program source file, select **File⇨Open** from the menu. If the PPG window currently contains a flow chart, a dialog box appears, asking if you want to save changes to the flow chart. Select **Yes** to save the file or **No** to discard changes. The Open dialog box then appears (see figure 3-30).

Figure 3-30. The Open dialog box



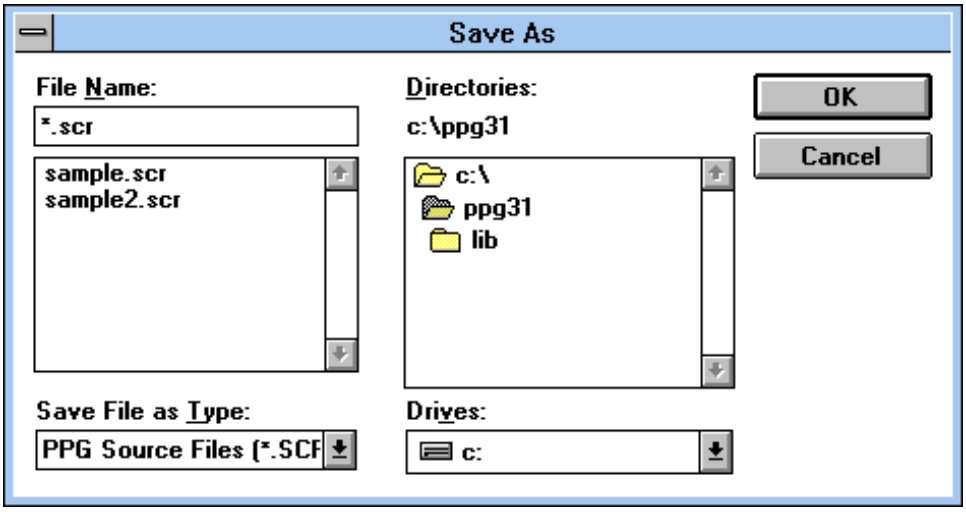
By default, the **File** list shows all program source (.SCR) files in the PPG31 directory. If the file you want is located elsewhere, choose the drive and directory from those lists, or type them in the input box. Select the file you want to open from the **File** list or type its name in the input box, and select **OK**. The specified file is loaded into the PPG window.

When you compile a program source file (using the **File⇨Download Program** command—see page 92), PPG creates a new file that is suitable for programming your portable. The original .SCR file remains intact, and the compiled file is given the same name, but with a .HEX extension. It is this .HEX file that is downloaded into the portable. Once you've compiled a program source file, you can use the **File⇨Open** command in the Percon Portable Programmer window to download its .HEX file into your portable without having to recompile it. (You can also load a .HEX file from DOS using the PDPROG application in the PPG31 directory. Enter **`pdprog /?`** on the DOS command line for information about using the program.)

Saving a File

To save a newly created file for the first time (or to save an existing file with a different name), choose **File**⇨**Save As**. The Save As dialog box appears (see figure 3-31).

Figure 3-31. The Save As dialog box



Enter a name for the new file in the **File Name** input box. The file list below it shows the names of all existing source-program files in the PPG31 directory. Unless you want to overwrite the contents of an existing file, use a unique name. PPG automatically gives the program file an .SCR extension.

By default, the file is saved in the directory in which you installed PPG, and this is where PPG will look when you go to open a file. If you want to store the file elsewhere, select the drive and directory from those lists, or type them before the file name in the input box.

Select **OK** to save the program flow chart in the specified file. If a file of that name already exists in the specified directory, a dialog box appears, asking if you want to replace the existing file. Select **Yes** to replace the file or **No** to return to the Save As dialog box, where you can give the file another name or place it in another location.

Once you've saved your flow chart in a file, you can use **File**⇨**Save** to save changes to it without being prompted for a file name again. To save the file under a different name or in a different location, use **File**⇨**Save As**.

Starting a New File

To clear the PPG window so that you can start a new flow chart, select **File**⇨**New**. A dialog box appears, asking if you want to save changes to the current flow chart. Choose **Yes** or **No**. If you choose Yes and the flow chart is unnamed, the Save As dialog box appears (see figure 3-31) so that you can name the file to store it in. If you choose **Yes** and the file is already named, it will be saved automatically. The current flow chart is then removed from the window so that you can start fresh.

Printing a File

To print the current view of a program flow chart, select **File**⇨**Print**. The displayed Frames or Nodes view is sent to the printer, and a message box appears. Select **Cancel** in the message box to abort printing.

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You can print only one view of a flow chart at a time.

Using the Program Emulator

The emulator feature of PPG lets you test your program source file before loading it into your portable. It runs your program in a separate window that is modeled after the face of the portable. It shows what would appear in the portable's display at each step and responds to your input just as the program would. You can simulate scanning codes, pressing function keys, and entering data with the data keys. If there are any problems with the program, you can pinpoint them and make corrections before programming the portable.

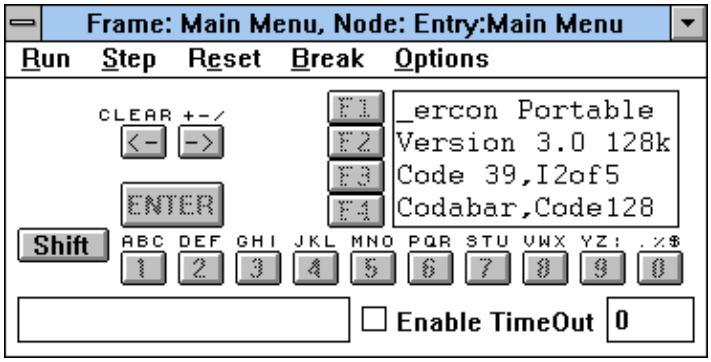
* N O T E *

You cannot save or access files in the emulator.

The Emulation Window

To load the current program into the Emulation window, select **View**⇨**Emulation**. The Emulation window appears (see figure 3-32). The name of the emulated program's current frame and node are displayed in the title bar. Commands on the menu bar of the window let you run the program and set emulation options.

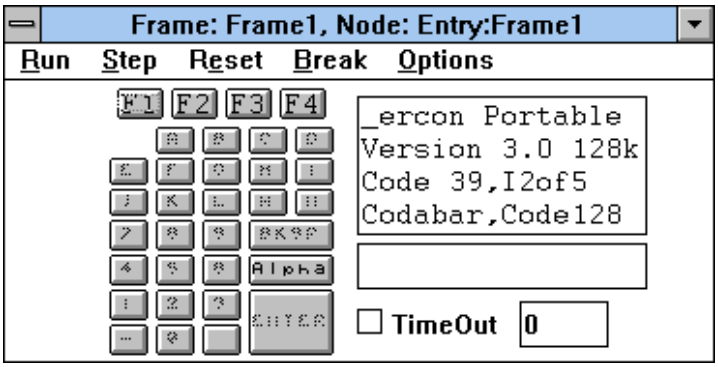
Figure 3-32. The Emulation window



By default, the Emulation window is modeled after the face of a Percon PocketReader. The right side of the window simulates the PocketReader's screen and displays its contents at each point in the program. Below and to the left of the screen are data and function keys. You can click on any of these keys with a mouse to simulate pressing them. An input box at the bottom of the screen displays data you enter, and a check box lets you enable or disable the input timeout option (if allowed). When timeout is enabled, the timeout count-down is displayed in the box at the bottom right of the window.

If you select **Options**⇨**PT 2000** from the menu, the Emulation window changes to represent the face of a PT 2000 portable (see figure 3-33).

Figure 3-33. The PT 2000 Emulation window



Emulation Menu Options

Both Emulation windows include a menu bar at the top that contains the following commands:

- **Run** begins execution of the program. The program will continues until it comes to a point that requires input or it encounters a breakpoint (see **Break**).
- **Step** executes the next step of the program and then stops. This allows you to "walk through" the program one node at a time. The node about to be executed is shown in the title bar.
- **Reset** takes the emulator back to the first node of the program's start frame.
- **Break** lets you specify certain nodes in your program as *breakpoints,* at which the emulator will stop until you select the Run or Step command (see "Setting Breakpoints," on page 89).
- **Options** lets you switch between the **PocketReader** and **PT 2000** display styles. It also gives you the following options:
  - **Watch** lets you view the contents of specified registers in a separate window as the program is executed (see "Watching Register Contents," on page 90).
  - **Trace** displays a list of each step executed by the emulator in a separate window (see "Tracing Program Execution," on page 91).

To protect existing data files during testing, the program emulator won't store data in files.

Use the **Break**, **Watch**, and **Trace** commands to set up options for the emulator. Then select **Run** or **Step** to execute the program. During execution, when an Input node is reached, the menu bar changes to contain the following commands:

- **Wand** passes the data in the input box to the portable's emulator as if it were scanned with the wand. If wand input is not allowed at the current point in the program, this command is dimmed and can't be selected.
- **Serial** passes the data in the input box to the portable's emulator as if it were transmitted over the serial port. If serial input is not allowed, this command is dimmed and can't be selected.
- **Timeout** simulates the passage of a given amount of time with no input. The timeout length is set in an Input node and is counted down in the box in the bottom-right corner of the Emulation window. This command is available only if the current Input node has a timeout setting and the Enable Timeout check box is selected in the Emulation window.
- **Stop** halts execution of the program and restores the original commands on the menu bar.

When the program is at a point where it requires input from the user, you can click on data or function keys (or type alphanumeric keys on the keyboard) to enter data in the Emulation window's input box. Then click on the **ENTER** button to simulate key entry, or select **Wand** or **Serial** to simulate scanning or serial input. The program processes the input and continues with the next step.

To enter a letter with the keys in the Emulation window, first click on the **Shift** button until the letter you want is displayed on one of the keys. Then select that key. Although there are only four function keys, **F1** through **F4**, you can also access **F5** through **F8** by pressing the **Shift** button until those key identifications appear.

When you're done working with the program, select **Stop** in the menu bar to halt execution. When you're done with the program emulator, double-click on the Emulation window's **Control-menu box**, or select **Close** from the Control menu. The Emulation window closes, and the program returns to the PPG window.

Setting Breakpoints

If there are certain areas of your program that you want to focus in on, you can set a *breakpoint* at one or more nodes. When you execute the program (with the Run command), the emulator will pause execution wherever there is a breakpoint. You can then use Run or Step to resume execution.

To set a breakpoint, select **Break** from the menu bar. (If you're running a program, you'll have to stop it first.) Then move the mouse pointer to the flow chart, where it becomes a rounded box labeled "BREAK". Position the BREAK pointer on the node where you want to pause execution, and click the **left mouse button**.

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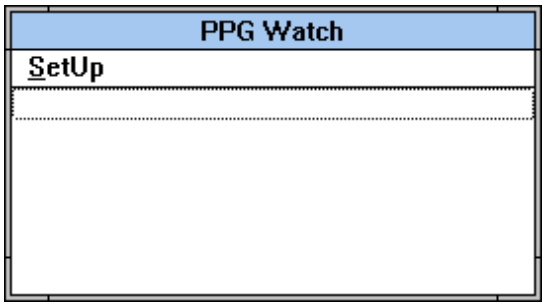
You can move the Emulation window to another part of the screen if you need to click on a node that is underneath it. If the node is in another frame, you'll need to display that frame's nodes *before* selecting **Break**.

Nodes that you specify as breakpoints are indicated by red lettering on the screen. To remove a breakpoint from a node, choose the **Break** command and click on the node again.

Watching Register Contents

To make sure that data is being stored correctly in registers, you can use the **Watch** command to view register contents while the emulator runs the program. When you select **Options**⇨**Watch** from the Emulation window menu, the PPG Watch window appears (see figure 3-34). You can reposition or resize the window.

Figure 3-34. The PPG Watch window



The PPG Watch window is initially set up to show the contents of the default register. To view the contents of other registers, choose **SetUp** from the PPG Watch menu bar to display the Setup Watch dialog box (see figure 3-35).

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If you're running a program, you'll have to stop it before selecting **SetUp**.

Figure 3-35. The Setup Watch dialog box

The top part of the dialog box lists all registers available for use in the program, including standard PPG registers. The bottom part lists registers that will be tracked in the PPG Watch window. To add a register to the **Watch** list, select the register in the **Registers** list and then select **Add**. To remove a register from the **Watch** list, select it and then select **Remove**. When the **Watch** list includes all the registers whose contents you want to view during emulation, select **Ok**.

When you run the program in the Emulation window, the PPG Watch window shows the name of each register in the **Watch** list along with its current contents. You can see what data is entered into each register when it is entered.

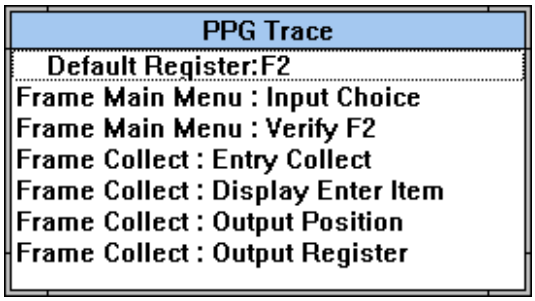
To close the PPG Watch window, select **Options**⇨**Watch** from the Emulation window menu again. (If you're running a program, stop it first.)

Tracing Program Execution

For a detailed log of every step taken by the emulated program, select **Options**⇨**Trace** from the Emulation window menu. This opens the PPG Trace window (see figure 3-36), which lists all emulator activity, including the following:

- The name of each frame and node executed by the emulator.
- The value of any register entered through an Input node.
- The value of any register that changes because of a step in any node.

Figure 3-36. The PPG Trace window


PPG Trace
Default Register:F2
Frame Main Menu : Input Choice
Frame Main Menu : Verify F2
Frame Collect : Entry Collect
Frame Collect : Display Enter Item
Frame Collect : Output Position
Frame Collect : Output Register

You can drag the sides of the PPG Trace window to resize it, and you can drag its title bar to reposition it on the screen. Use the scroll bars (when they appear) to scroll through the list of actions.

To close the Trace window, select **Stop** in the Emulation window, if necessary, to halt program execution, and then select **Options**⇨**Trace** again.

Downloading a Program

To load a program into your Percon portable, complete the following steps:

1. Connect the 25-pin connector of the cable to a serial port on your computer. (If you don't have a 25-pin serial port, use the 25-to-9-pin adapter supplied with your portable.)
2. Connect the other end of the cable to the portable.
3. Turn the portable on.
4. In the PPG window, select **File⇨Download Program** from the menu. If a dialog box appears, asking if you want to save changes to the file, answer **Yes** or **No**.

   The Percon Portable Compiler window appears momentarily as PPG compiles the program, translating it into a language understood by the portable. The original **.**SCR file remains intact, and the compiled file is given the same name, but with a .HEX extension. It is this .HEX file that is downloaded into the portable.

While a program is downloading, you can work in another application window.

When compiling is complete, the Percon Portable Programmer window appears, displaying the message "Initiating Download." If connection is successful, the window shows further messages as the compiled .HEX file is loaded into the portable. The percentage of completion is displayed as the programming progresses.

When downloading is complete, you'll see the message "Portable successfully programmed" in the Percon Portable Programmer window, and the program's Main Menu will appear in the portable's display.

5. Double-click on the Percon Portable Programmer window's **Control-menu box** or select **File⇨Exit** to close the window.

Most of the time, downloading is very quick. Downloading the compiled program file takes approximately 15 seconds. If the bar code settings for the program (see "Specifying Bar Code Type," on page 83) are different from those currently set in the portable, they will be downloaded as well, taking an additional 15 seconds or so.

The downloader also checks the version number of the portable's operating system. If it is different from PPG's version, it downloads the operating system along with the program; this can take two or three minutes. When the system software is being upgraded with a new release, progress is shown as a percentage in the Percon Portable Programmer window.

If you remove all power sources while downloading only the compiled program or bar code settings, you will have to program the portable again. However, if you are downloading the operating system to the portable, the portable could be left without an operating system; you would have to return it to Percon for servicing.

If you're downloading a program file to several portables, or if you switch between two or more programs in a portable, you may find it easier to download the program's compiled file, rather than recompiling the source file each time. Once you're in the Percon Portable Programmer window, you can use the **File⇨Open** command to download a previously compiled .HEX file. This command displays the standard Open dialog box (see page 85), listing all .HEX files in the PPG31 directory. Specify a file and select **OK**. Downloading begins immediately.

To access the Percon Portable Programmer window directly from Windows, double-click on the **PROG icon** in the Percon PPG31 program group.

If You Have Problems

If the message "Timeout Exceeded" appears or nothing happens at all, PPG was unable to make the connection with the portable. It may be that your serial port is not COM2. Click on the **Comm** command in the Percon Portable Programmer menu bar until it reflects the number of your COM (communication) port. Then select the **Download Program** command again. The COM setting is automatically stored with PPG and used the next time you download a program.

Also, make sure that the cable is firmly connected at both ends. You might try resetting the portable by pressing **SHIFT+ENTER** (**ALPHA+ENTER** on the PT 2000) while you reinsert the battery.

Depending on the program currently loaded into the portable, you may need to scan the following bar code or select options in the portable to place it in a mode for accepting downloaded data.

Transferring Data to and from the Portable

PPG comes with two programs that you can use to transfer data between your computer and a portable:

- **PTFER** is a Windows application, with its own icon in the Percon PPG31 group window.
- **PDTFER** is a DOS program that you run by issuing commands on the DOS command line.

Also available from Percon are two utilities for transferring data to and from a Macintosh or UNIX computer:

- **MACTFER** is a Macintosh program you can use to communicate with a Macintosh.
- **updtfer** is a UNIX program you can use to communicate with a UNIX workstation.

Once you've collected data with your portable, you can use any of these programs to copy the data into a file that can be read by another application. You can also copy a file (for example, a list of valid ID numbers to be checked against) from the PC or Macintosh to a portable.

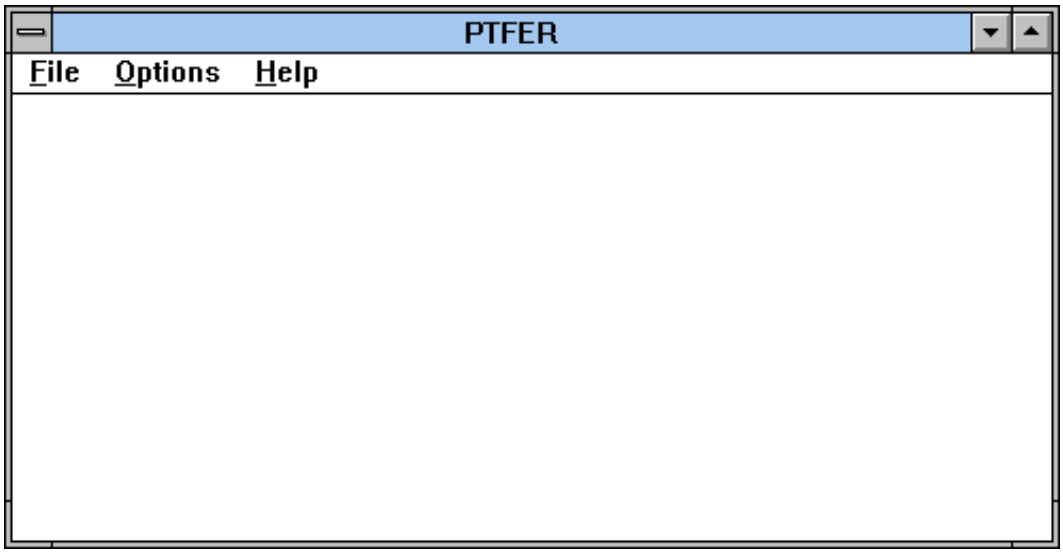
Using PTFER

To transfer data between the PC and the portable using the Windows PTFER application, complete the following steps:

1. Select **File**⇨**Exit** to exit PPG, or click on the **Minimize button** on the title bar to shrink PPG into an icon at the bottom of the Windows desktop.

2. Double-click on the **PTFER icon** in the Percon PPG31 program group (in the Windows Program Manager). A blank PTFER window opens, as shown in figure 3-37.

Figure 3-37. The PTFER window

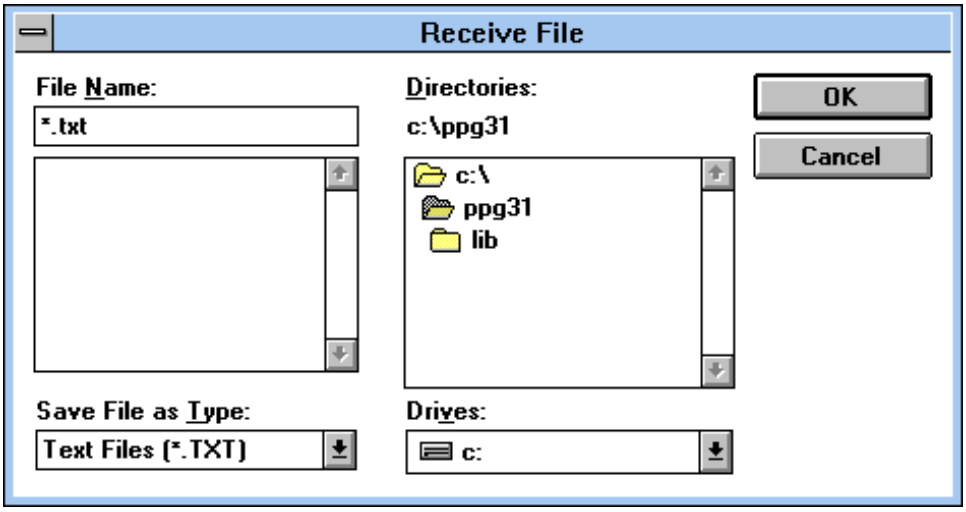


3. By default, PTFER uses the COM2 port for data transfer, with the communications settings listed in the following section. If you need to switch to a different COM port or change baud rate, parity, stop bits, or data bits, select **Options**⇨**Settings** from the menu, and make whatever adjustments you need in the Communications Settings dialog box (see "Setting Options," on page 96).
4. Select **Options**⇨**Connect** (or click on the **Connect** button in the Communications Settings dialog box) to connect PPG with the correct COM port. The message "Communications port opened" appears in the window.

This connection is between the application and the COM port, *not* the portable. If you don't see the success message, make sure that no other devices are using the port. You may need to try a different COM port. Select **Options**⇨**Settings** again, and select another port.

5. To upload a file from the portable to the PC, select **File**⇨**Receive** and use the Receive File dialog box (see figure 3-38) to specify the name and location of the file you want to store the data in. If the file is not in the PPG31 directory, select the drive and directory from the lists, or type the path in the input box. Choose the file from the file list or type its name in the input box. Then select **OK**.

Figure 3-38. The Receive File dialog box



The name of the file you specify is displayed in the title bar. You can then select options on the portable to upload the data into the specified PC file.

6. To send a file to the portable, select **File**⇨**Send** from the menu, and specify the name and location of the file in the Send File dialog box. (The Send File dialog box is identical to the Receive File dialog box except for the title bar.) To accept the transferred file, the portable must be programmed to accept serial input and store it in a file or register. Depending on the program, you may need to select some options on the portable first. When the file has been successfully transferred, a “Transfer completed” message appears in the PTFER window.

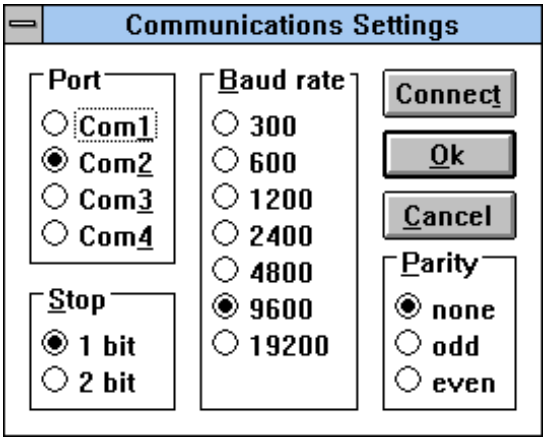
SETTING OPTIONS By default, the PTFER application uses your computer's COM2 port for communicating with the portable, and it reinitializes the port with the following settings:

Baud rate: 9600
Stop bits: 1
Data bits: 8
Parity: None
Protocol: ACK/NAK

If your COM2 port is already in use by a modem, mouse, or other device, you'll need to specify a different COM port. You can also alter the communications settings for the port if you wish.

To use a different COM port or to alter port settings, select **Options**⇨**Settings** from the PTFER menu. The Communications Settings dialog box appears (see figure 3-39).

Figure 3-39. The Communications Settings dialog box



When a connection has been made to the serial port, the Settings option is dimmed on the menu and cannot be selected. Select **Options**⇨**Connect** again to disconnect the application, and then select **Options**⇨**Settings** again.

To use a different COM port, select it in the **Port** option group. You can also switch baud rate, the number of stop bits, and the type of parity. (The settings you use should match the settings used on the portable.)

If you're unsure of the meaning of these settings, it's best to leave them alone. If you changed them in the portable and want to restore the factory default settings, scan the following bar code symbol:

When you're done, you can click on the **Connect** button to connect to the port directly, or select **Ok** and then use the **Connect** command in the menu to make the connection.

SETTING COMMAND LINE OPTIONS You can also change settings for PTFER by entering options in the application's Program Item Properties window in the Windows Program Manager. Type the options in the **Command Line** input box, using the following syntax:

ptfer *filename* -|/[P*n*][B*n*][*action*]

where

filename = the name of the file you want to download or store uploaded data into
n = the number of the COM port to be used (**1, 2**, **3**, or **4**; the default setting is **P2**) or the baud rate to use (the default setting is **B9600**)
action = **A** to receive data and append it to the existing file
C to connect (transmit or receive auto connects)
E to echo the display to the screen
H to display onscreen help
M to maximize the PTFER window
N to minimize the PTFER window
0*n n n n* = position and size of the PTFER window
R to receive data from the portable and replace the existing file contents
S to display the line count in the title bar
T to transfer data to the portable (the default)
X to exit automatically after data is transmitted or received

The port, baud rate, and action parameters are optional. If you use one or more parameters, you must precede them with a hyphen (**-**) or a slash (***/***). You can enter parameters either before or after the file name.

For example, the command **ptfer link.txt /1** would send the file named LINK.TXT over COM1 to the portable (the default action, **T**, is assumed). The command **ptfer -3r data.txt** would upload data from the portable over COM3 into a file named DATA.TXT. To specify a file that is not in the current directory, include the path name in the command (for example, **ptfer c:\ppg31\data\link.txt /2**).

The port, baud rate, and position and size settings are saved to and restored from the initialization file.

For more information about the Program Item Properties window, refer to your Microsoft Windows documentation.

Using PDTFER

Instead of using the PTFER application in Windows, you can transfer files to and from the portable using commands on the DOS command line. If you're not already in Windows, this is faster and more convenient than loading Windows to access the transfer application.

The command line syntax for transferring files with PDTFER is as follows:

pdtfer *filename* -|/[*port*][B*n*][*action*]

where

filename = the name of the file you want to download or store uploaded data into
port = the number of the COM port to use (**1, 2**, **3**, or **4**; the default setting is **2**)
n = the baud rate to use (the default setting is **B9600**)
action = **A** to receive data and append it to the existing file
E to echo the display to the screen
H to display onscreen help
R to receive data from the portable and replace the existing file contents
T to transfer data to the portable (the default)

The port and action parameters are optional. If you use one or more parameters, you must precede them with a hyphen (**-**) or a slash (***/***). They can be entered either before or after the file name.

For example, the command **pdtfer link.txt /1** would send the file named LINK.TXT over COM1 to the portable (the default action, **T**, is assumed). The command **pdtfer -3r data.txt** would upload data from the portable over COM3 into a file named DATA.TXT. To specify a file that is not in the current directory, include the path name in the command (for example, **pdtfer c:\ppg31\data\link.txt /2**).

USING MACTFER

Upon request, Percon will supply a program for transferring data between a portable and a Macintosh computer. To install the program, just copy the MACTFER.EXE file from the supplied floppy disk to your Macintosh hard drive. To transfer data using the MACTFER program, complete the following steps:

1. Make sure the portable's communication parameters are set as follows:

   Baud rate: 9600
   Stop bits: 1
   Data bits: 8
   Parity: None
   Protocol: ACK/NAK

2. Connect the 25-pin connector of the cable (labeled "COM") to the 25-pin connector on the Macintosh cable. (Use a modem-type cable.)

3. Connect the other end of the cable to the serial port on the portable.

4. Plug the “mini-DIN” end of the Macintosh cable into the Macintosh modem port (A).
5. Start the MACTFER program on the Macintosh. An untitled window appears for displaying received or transferred data.
6. To upload a file from the portable to the Macintosh, select **File**⇨**Receive** and use the Receive File dialog box to specify the name and location of the file you want to store the data in. You can then select options on the portable to upload the data into the specified Macintosh file.

You can copy received data to other applications using the **Edit**⇨**Copy** command.

7. To send a file to the portable, select **File**⇨**Send** and specify the name and location of the file in the Send File dialog box. To accept the transferred file, the portable must be programmed to accept serial input and store it in a file or register. Depending on the program, you may need to select some options on the portable first.

Using updtfer

Upon request, Percon will supply a program for transferring data between the portable and a UNIX computer. To install the program, use the **tar** command to copy the updtfer file from the supplied floppy disk to your UNIX hard drive. The updtfer program transmits and receives data to or from a portable using Percon's proprietary ACK/NAK protocol.

The command syntax for transferring files with updtfer is as follows:

updtfer *device filename -options*

where

device = the serial port device name, such as /dev/tty1a
filename = the name of the file you want to download or store uploaded data in
options = one or more transfer options, preceded by a hyphen (**-**)

You can use any of the following options:

- **t** transmits data in the given file to the portable. The portable should be properly connected to the specified serial port and ready to receive data.
- **r** receives data from the portable and stores it in the given file. When receiving data from the portable, you should start updtfer before invoking the transfer on the portable.
- **a** appends the given file with data received from the portable.
- **d** displays debugging information on the screen during transfer.
- **s** performs the transfer “silently” (without displaying received data on the screen).
- **h** displays help on program usage and options.

For example, **updtfer /dev/tty2a readin.dat -r** would receive data from the portable connected to a serial port named /dev/tty2a and place data in a file named readin.dat.

The updtfer program has the following fixed line settings. The portable's communications settings must match.

Baud rate: 9600
Stop bits: 1
Data bits: 8
Parity: None
Flow control: ACK/NAK; no XON/XOFF

The updtfer program returns an exit status of 0 if the transfer is successful. If the transfer is unsuccessful, it returns a nonzero status, such as 1.

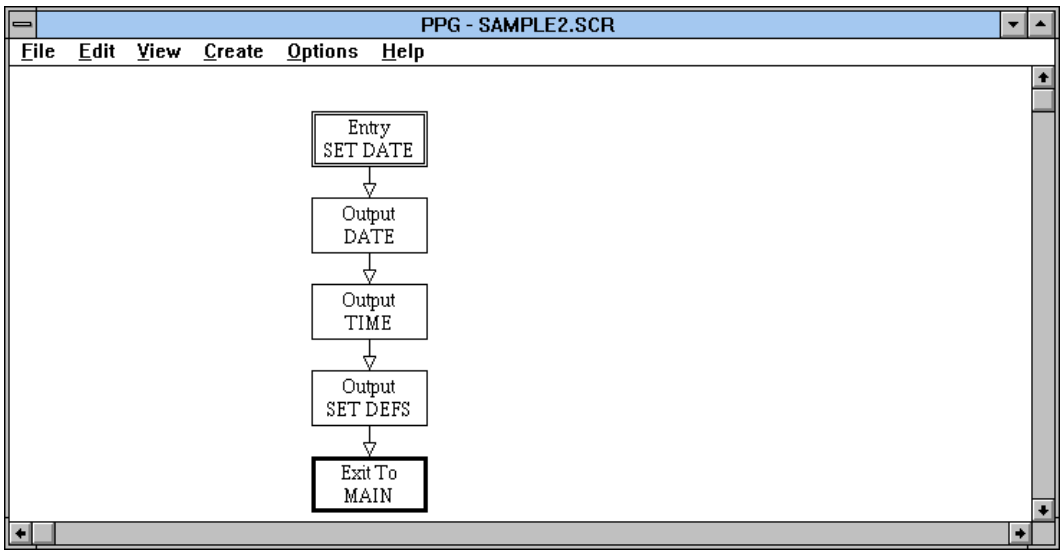
Chapter 4
Example Frames

This chapter gives several examples of frames you might want to incorporate into your Percon Program Generator (PPG) programs. If a frame executes actions that you might use in more than one place in a program, you can build it as a subroutine. Then use a Call node to execute the subroutine whenever you need it. The program source files for these frames are included on your PPG disk; they are placed in the C:\PPG31\LIB\TIPS subdirectory during normal installation.

Setting the Date and Time

All Percon portables include a clock that keeps track of the current date and time. To allow users to adjust the date and time settings, incorporate the frame shown in figure 4-1 into your PPG program.

Figure 4-1. A frame that lets users set the time and date



The nodes in this example work as follows:

- **Output : DATE** displays the current date as set in the portable. The **Output To** option for this node is set to **System**, and the **Source** option is set to **Constant**. In the **Constant** input box, the code "**%.**" tells the program to display the date. It also activates the system date function, which allows the user to enter a new date for the system.
- **Output : TIME** displays the currently set time. Again, **Output To** is set to **System** and **Source** is set to **Constant**. The **Constant** input box contains the code "**%-**" to display the time. It also activates the system time function, which allows the user to enter a new time for the system.
- **Output : SET DEFS** automatically sets bar code and serial defaults to the factory settings. **Output To** is set to **System** and **Source** is set to **Constant**. The Constant input box contains the following code:

$+$-D2C8EE

Changing the Auto Off Setting

By default, a Percon portable turns off automatically after ten minutes of inactivity. To change this setting, use an Output node within your PPG program. Set the **Output To** option to **System**, and select the **Constant** radio button for the **Source** option. In the **Constant** input box, enter the following:

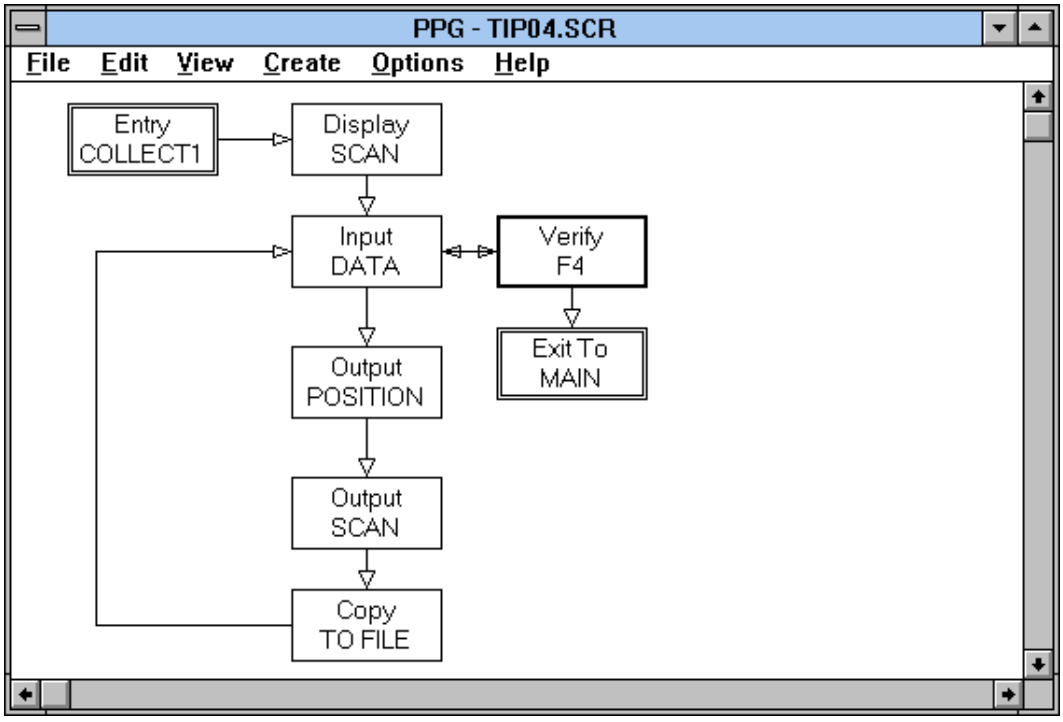
$+$-B2*nn*EE

where ***nn*** is the number of minutes you want to set the **Auto Off** option to. To disable **Auto Off**, enter **`00`** for ***nn***.

Displaying the Contents of a Register

To display the contents of a register on the portable, it's best to use two Output nodes, as shown in figure 4-2. The first Output node positions the cursor within the existing display screen, and the second writes the register contents starting at the cursor position. Without the first Output node, the register contents would be written on the last line of the display, which is not always desirable.

Figure 4-2. A frame that displays register contents

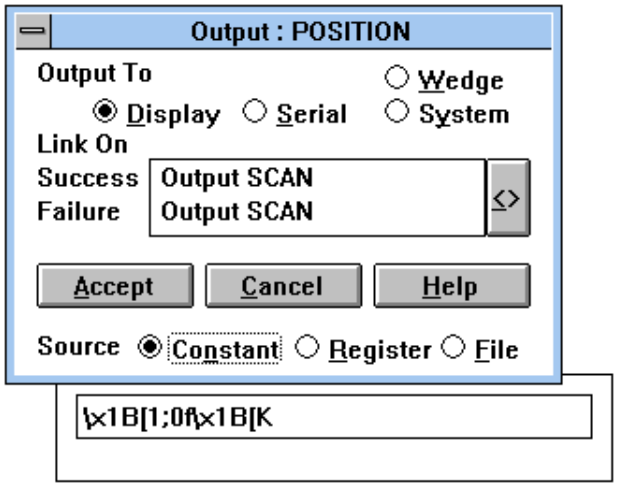


The nodes in this example work as follows:

- **Display : SCAN** requests the user to input an item or press **F4** to exit.

- **Input : DATA** displays user input on the second line of the portable screen and stores it in the default register.
- **Output : POSITION** positions the cursor at the beginning of the third line. Its dialog box contains the following settings:

Figure 4-3. The Output: POSITION dialog box



The **\x1B[1;0f** portion of the given command sequence positions the cursor at the beginning of the second row. (Rows and columns are numbered beginning with 0, so **[1** specifies the second row and **;0** specifies the first column.) The **f** positions the cursor within the existing screen, and the **\x1B[K** portion of the command clears any existing text on the line.

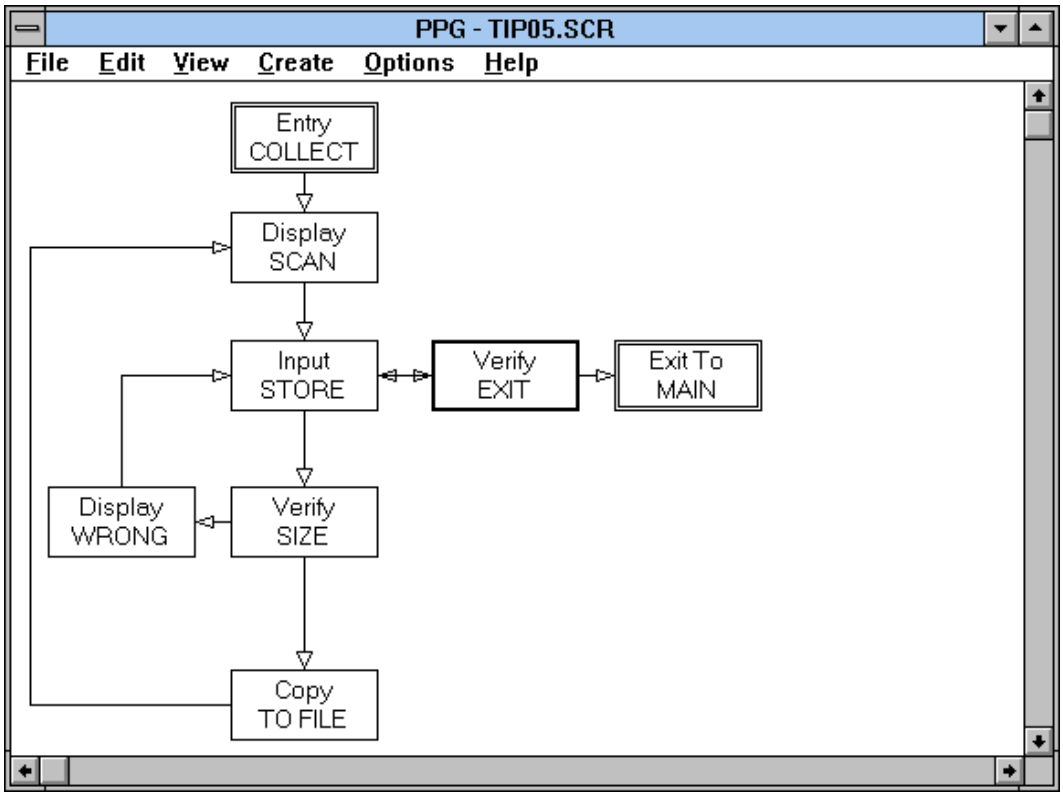
- **Output : SCAN** displays the contents of the default register at the cursor position. This leaves the Display node's menu prompt (**F4**) intact on the fourth line.
- **Copy : TO FILE** copies the input into a file and loops back to the Input node, where the user can either enter another item or press **F4** to exit.

If you were displaying a constant on the portable screen instead of register contents, you could combine the constant with the cursor-positioning command string in one Output node. For example, **\x1B[2;0f\x1B[KTEST** would put the word TEST on the third row.

Verifying Input Size

To verify that a scanned or entered code is a given number of characters or within a given range, use the **Size to Register** option in the Input node collecting the data. This option stores the number of characters of the given input in a separate register, which can then be checked with a Verify node. Figure 4-4 shows an example of this.

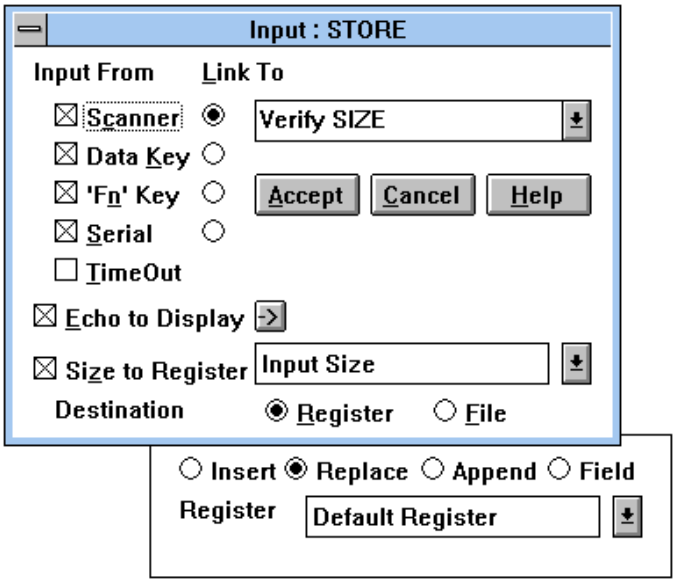
Figure 4-4. A frame that verifies input size



The nodes in the example work as follows:

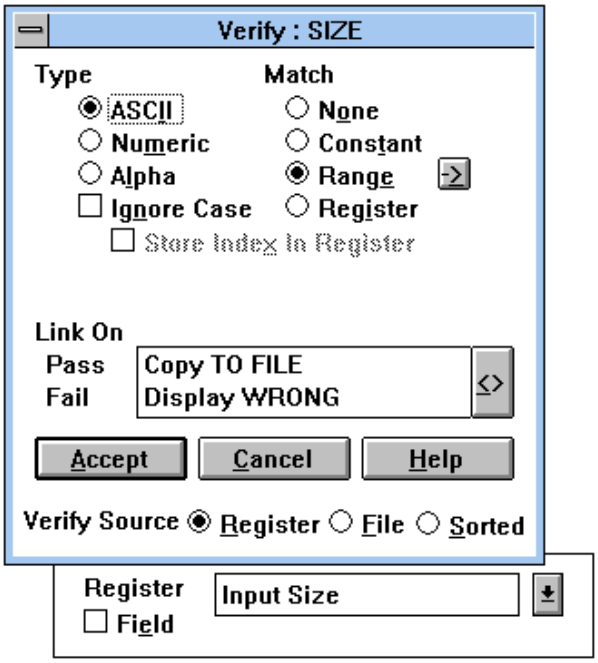
- **Display : SCAN** instructs the user to scan a bar code.
- **Input : STORE** stores the input code in the default register and (with the **Size to Register** option) stores the character length of the code in a register named Input Size (see figure 4-5).

Figure 4-5. The Input : STORE dialog box



- **Verify : EXIT** checks to see if the user pressed **F4**. If so, it exits the frame.
- **Verify : SIZE** checks the value stored in the Input Size register. The options in its dialog box are set as shown in figure 4-6.

Figure 4-6. The Verify: SIZE dialog box

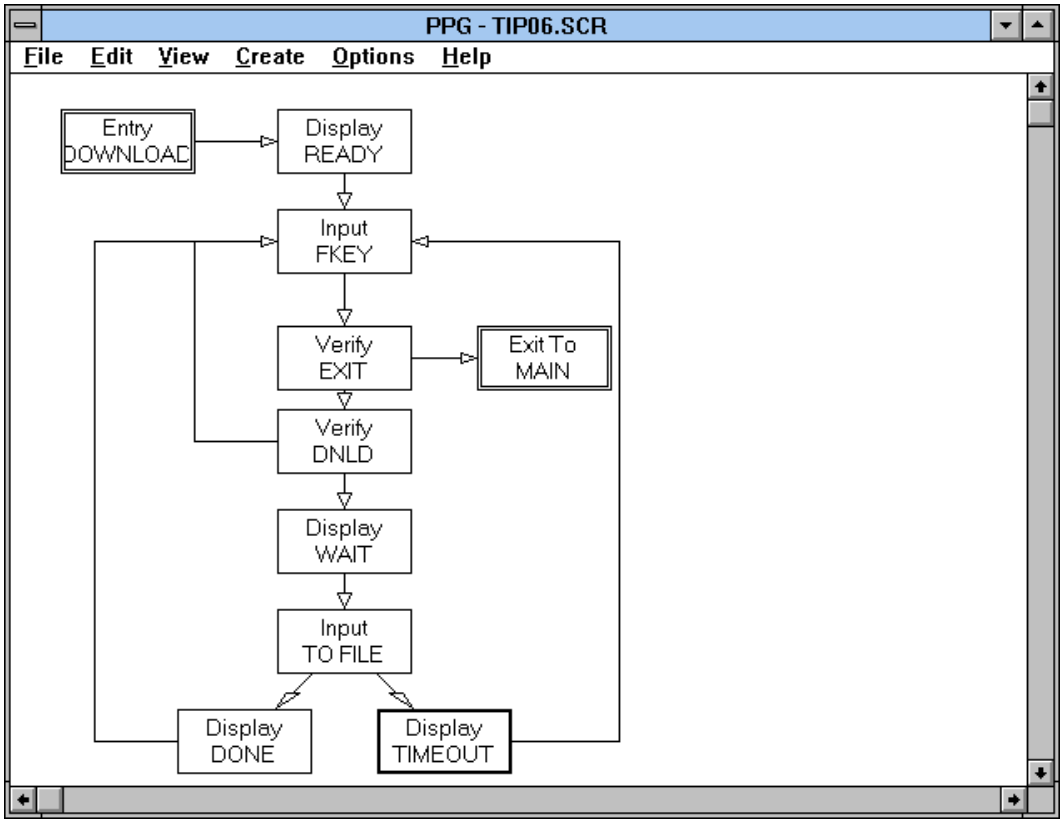


- If the Input Size value is within the given range (6 to 10; see "Specifying a Range to Match," on page 70), **Copy : TO FILE** copies the scanned code from the default register into a file and loops back to the **Input : STORE** node so that further codes can be scanned.
- If the Input Size value is outside the defined range, **Display : WRONG** displays "INCORRECT INPUT; REENTER" on the portable's screen and loops back to the Input node so that the code can be scanned again.

Downloading a File to a Percon Portable

Usually, users will need to upload files containing scanned or input codes to a host computer. However, it is sometimes necessary to download a file from a host to a portable. For example, you might have an inventory file that you need to check scanned codes against. The example in figure 4-7 downloads a file from the host computer to a connected portable.

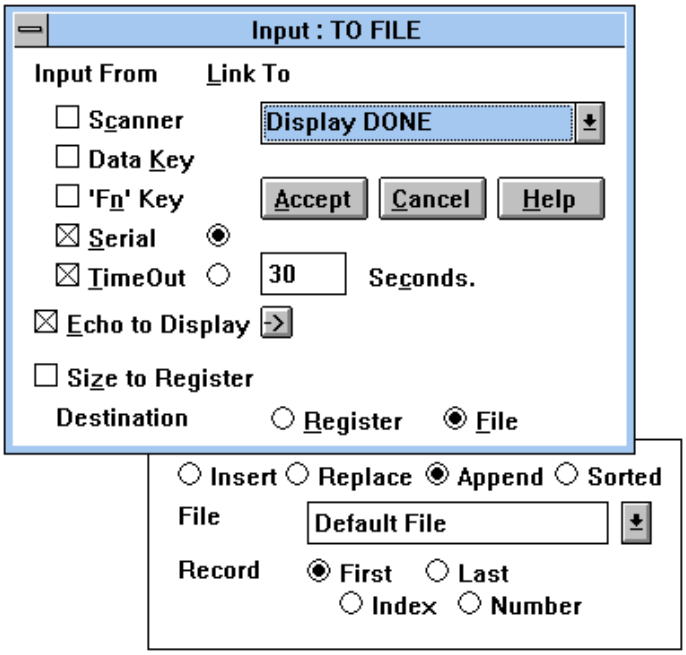
Figure 4-7. A frame that downloads a file



The nodes in this example work as follows:

- **Display : READY** instructs the user to press **F3** to download a file or **F4** to exit.
- **Input : FKEY** accepts function key input.
- **Verify : EXIT** checks to see if **F4** was pressed and, if it was, exits the frame.
- **Verify : DNLD** checks to see if **F3** was pressed and, if it was, continues to the Display node. If **F3** was not pressed, the program loops back to the Input node and waits for further input.
- **Display : WAIT** displays "Downloading, Please Wait" on the portable's screen.
- **Input : TO FILE** starts downloading the file. Options in its dialog box are set as shown in figure 4-8.

Figure 4-8. The Input: TO FILE dialog box



- If downloading is successful, **Display : DONE** displays "DOWNLOAD DONE; F3= MORE; F4=QUIT" on the portable's screen. If downloading is unsuccessful, **Display : TIMEOUT** displays "TIMEOUT EXCEEDED; F3=TRY AGAIN; F4=QUIT" on the portable's screen. Both these Display nodes loop back to the **Input : FKEY** node, which accepts the user's function key input.

To download a file to a portable, you must set options for the Input node as follows:

- The **Serial** and **TimeOut** radio buttons are both selected for the Input From option. **TimeOut** should link to a Display node that prompts the user to try again.

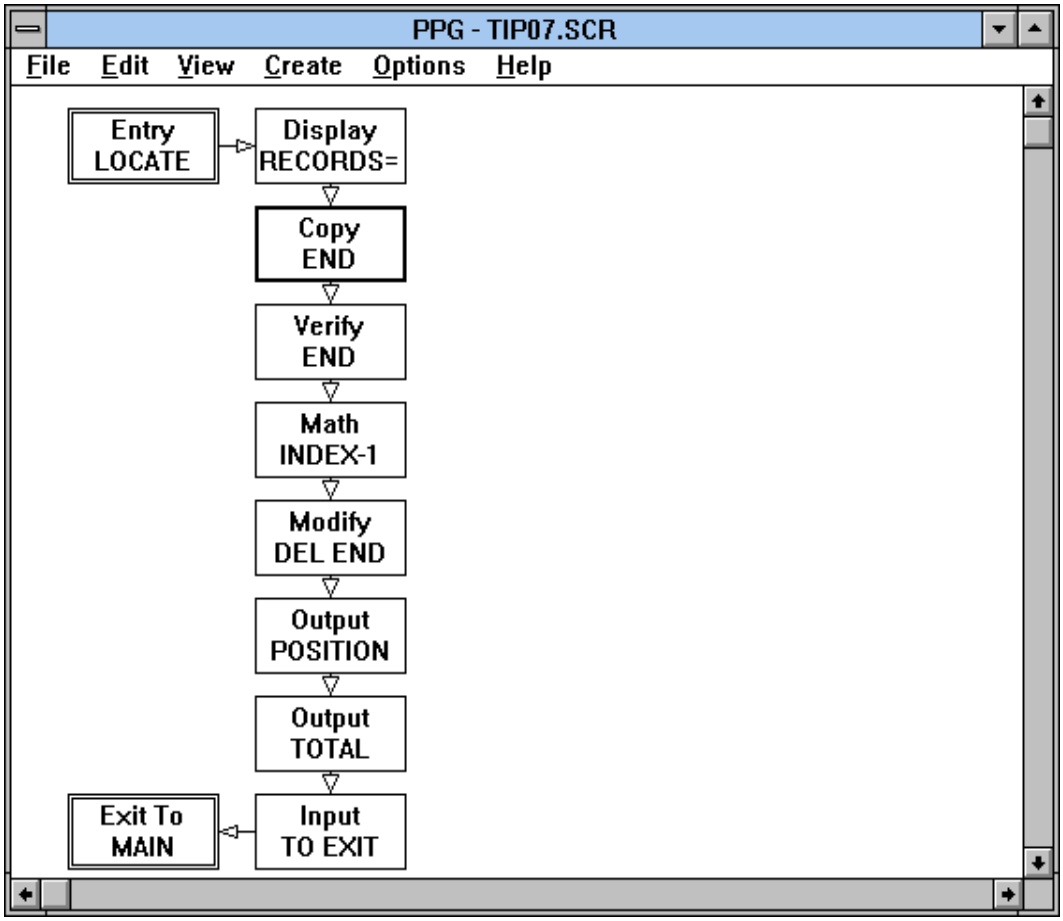
- **Destination** is set to the desired file. You can choose to replace existing data or place new data at the beginning or end of the file or at a given record number.
- The **Echo to Display** option is enabled so that the user can see the file going into the portable unit.

Finding the Number of Records in a File

The easiest way to determine the number of records in a file is to use a Verify node with **Match** set to a value you know is not in the file and the **Store Index in Register** check box selected (with a register specified for storing the index value). Since it won't find a match, the program will return the file size, storing it in the index register.

Another method copies a known value to the end of the file, uses a Verify node to locate it, and then subtracts 1 from the location index. This method is demonstrated in the example in figure 4-9.

Figure 4-9. A frame that determines the number of records in a file



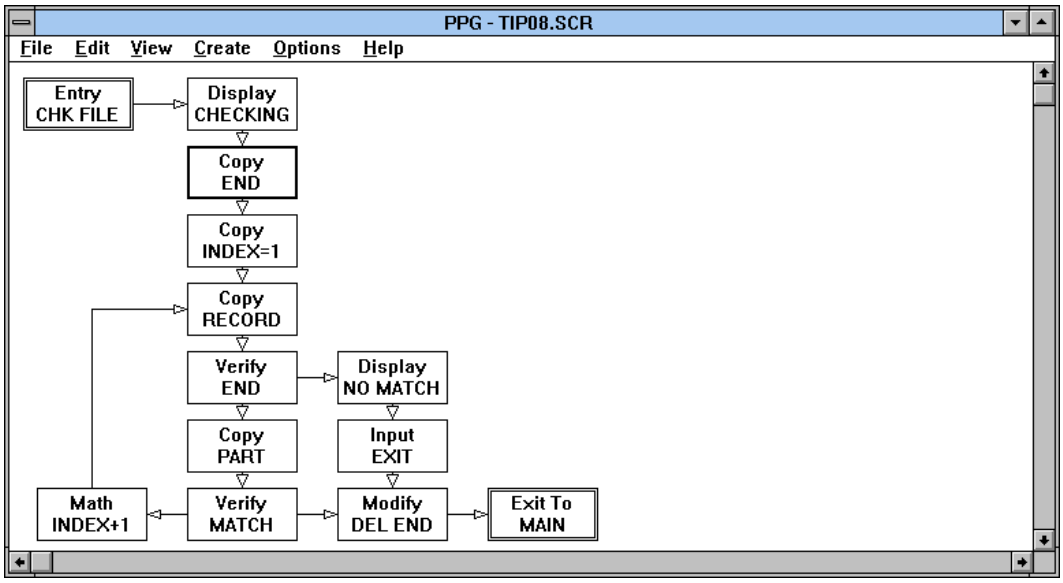
The nodes in this example work as follows:

- **Display : RECORDS=** writes “RECORDS=” on the portable’s screen.
- **Copy : END** copies the constant value “end” to the end of the file being checked.
- **Verify : END** looks for the constant “end” in the file and stores the index value of the matching record in a register named INDEX.
- **Math : INDEX-1** subtracts 1 from the index value.
- **Modify : DEL END** deletes the “end” record so that the constant doesn’t corrupt the file.
- **Output : POSITION** positions the cursor at column 8 in the first line, directly after “RECORDS=”.
- **Output : TOTAL** displays the index value at the cursor position on the portable screen.
- **Input : TO EXIT** waits for a function or data key to be pressed before returning to the **Main** frame.

Searching for a Partial Match

A Verify node will search a file for a record that matches a given value or text string, for example, the value 100. The program searches for *full* matches, however; records containing 1000 or 1001, for example, would not be considered a match. You can search for partial matches using a frame such as the one in figure 4-10. This example pulls one record at a time from the file and uses templates to check the section of the record that you are trying to match.

Figure 4-10. A frame that searches for a partial match



The nodes in this example perform the following actions:

- **Display : CHECKING** prompts the user to wait while the check is going on. This is especially important when working with large files that take a long time to check.
- **Copy : END** places the constant “end” at the end of the file being checked.
- **Copy : INDEX=1** stores the constant 1 in a register named INDEX.
- **Copy : RECORD** copies the record at index position 1 into the default register.
- As each record is copied, **Verify : END** looks for the constant “end” in the register. When “end” is found, the program has searched through to the end of the file; the search is discontinued, and “NO MATCH” is displayed on the portable’s screen. When the user presses a function key, the program deletes the “end” record and returns to the **Main** frame.
- If “end” is not found in the default register, the program assumes it is looking at a valid record and (with **Copy : PART**) uses a template to copy the part of the record being checked into another register, named CHECK.
- **Verify : MATCH** then checks to see if the contents of the CHECK register match the contents of the INDEX register.
- If the register contents match, **Modify : DEL END** deletes the “end” record, and the program returns to the main frame.
- If there is no match, **Math : INDEX+1** increases the index position number by 1 so that the program will look at the next register in the file.

This loop is continued until the program finds a match or reaches the “end” flag.

To speed up the search, you could split the records into two files and search for a complete match instead of a partial match (see the next section).

Splitting Records into Two Files

When verifying only a part of a record, you can accelerate the process by splitting the record into two different files and referencing each file’s index position. For example, if you had a file with the following records showing item numbers and descriptions:

item1, desc1
item2, desc2
item3, desc3

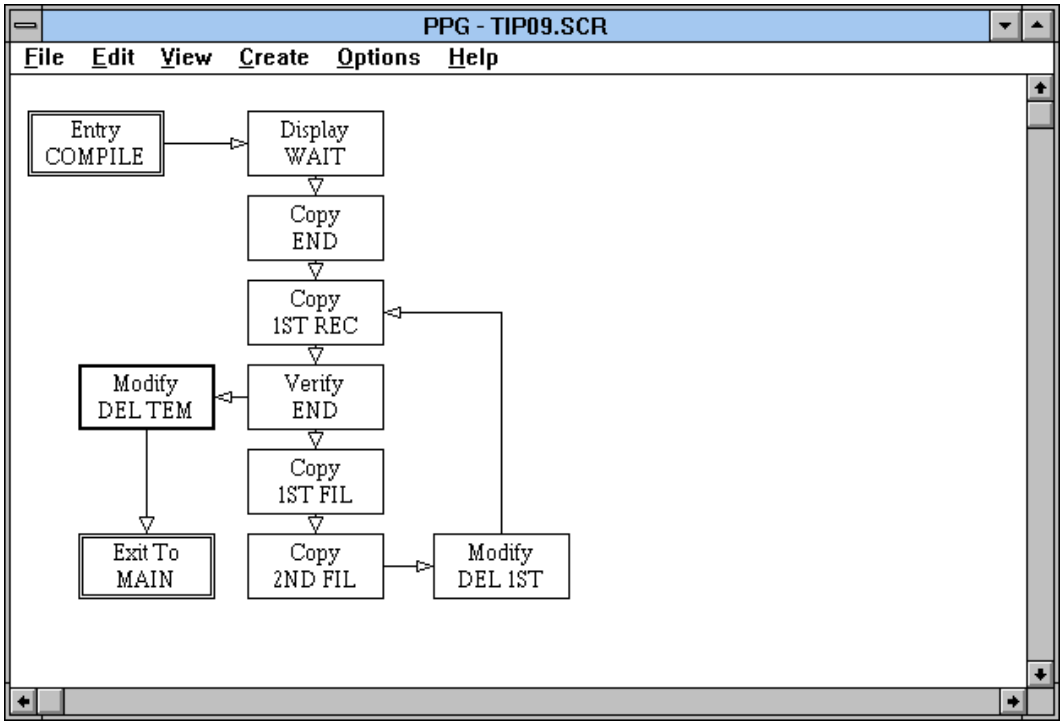
you could divide it into two files as follows:

File1	File2
item1	*desc1*
item2	*desc2*
item3	*desc3*

Instead of searching through both item numbers and descriptions, your program could search through File1, which contains item numbers only. When the item number is found, you can use the same index number to find the matching description in File2.

Figure 4-11 shows a sample program frame used to divide a data file into two files. (Use a different program first to load the file into the portable.)

Figure 4-11. A frame that divides records into two files



The nodes in this example work as follows:

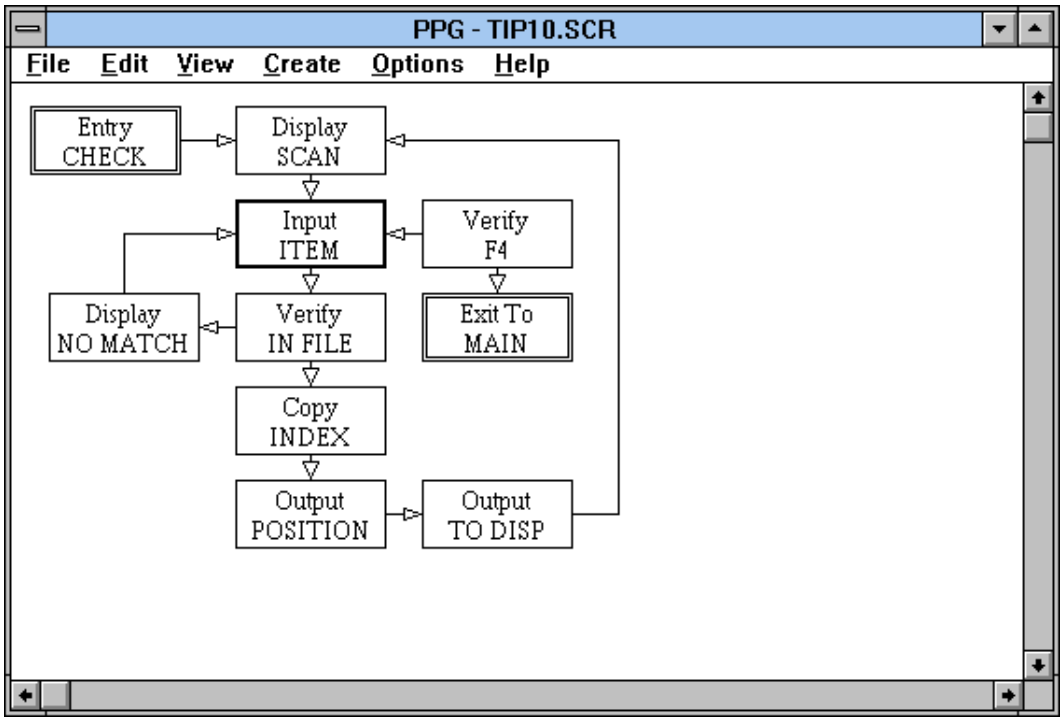
- **Display : WAIT** instructs the user to wait while the Percon portable completes this process.
- **Copy : END** places the constant “end” at the end of the file to mark the last record.
- **Copy : 1ST REC** copies the first record in the file into the default register.
- **Verify : END** checks to see whether the default register contains the constant “end”.
- If the default register doesn’t contain “end”, **Copy : 1ST FIL** copies the first part of the record to a different file (1ST FILE), and **Copy : 2ND FIL** copies the other part of the record into another file (2ND FILE).
- **Modify : DEL 1ST** deletes the first record in the original (default) file; what was the second record in the file is now the first.
- The program loops back to **Copy : 1ST FIL**, and the next record is split into two different files.

- This loop continues until the program reaches the final record (containing “end”). At that point, the program knows it has reached the end of the file, and **Modify : DEL TEMP** deletes the default file to make sure it’s clear for the next time it’s used. The program then returns to the **Main** frame.

Referencing Two Different Files

The example in figure 4-12 uses two data files: one that contains item numbers and one that contains item descriptions. Records in both are sorted identically. By referencing data in both files, this example displays the description of an item whose number is entered by the user.

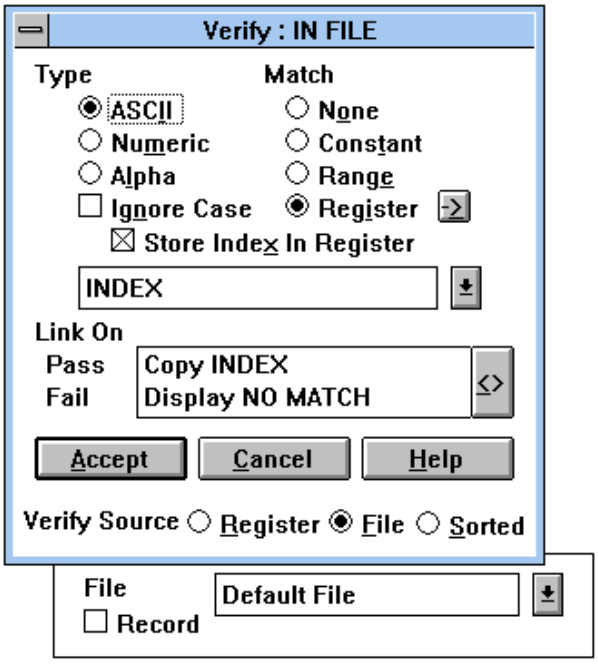
Figure 4-12. A frame that references two files



The nodes in this example work as follows:

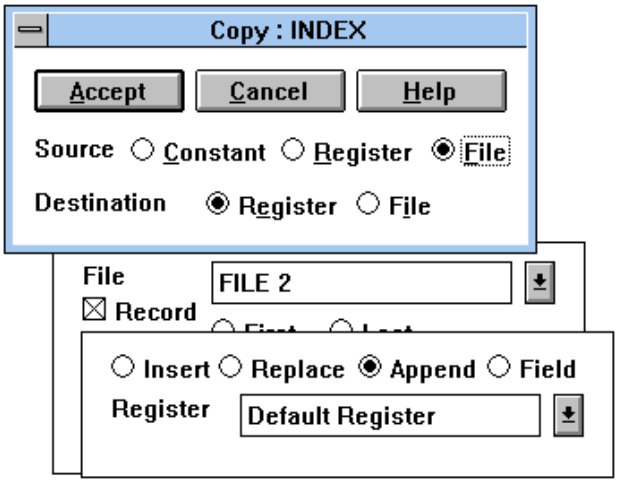
- **Display : SCAN** prompts the user to enter an item number or press **F4** to quit.
- **Input : ITEM** stores the input entry in the default register.
- **Verify : F4** checks to see whether the user pressed **F4**. If so, the program returns to the main frame.
- **Verify : IN FILE** checks the contents of the default register against the file with the items in it. Figure 4-13 shows the settings in the dialog box for the node.

Figure 4-13. The Verify: IN FILE dialog box



- If there is no match, **Display : NO MATCH** instructs the user to enter the item number again and loops back to **Input : ITEM**.
- If there *is* a match, the indexed position is put into a second register, and **Copy : INDEX** copies the record at that indexed position from the description file into the default register (see figure 4-14).

Figure 4-14. The Copy : INDEX dialog box

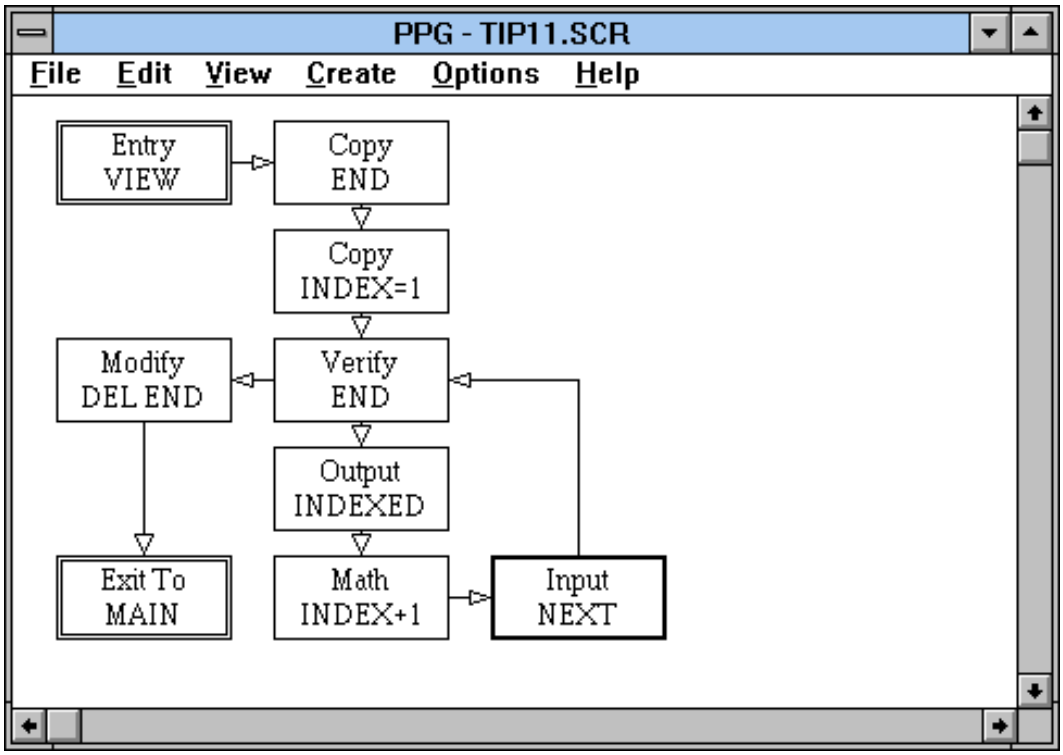


- **Output : POSITION** positions the cursor on the portable screen.
- **Output : TO DISP** writes the item description at the cursor position.
- The program returns to **Display : SCAN**, prompting the user to enter an item number again.

Reviewing a File

The example in figure 4-15 lets the user review the contents of a file, one record at a time.

Figure 4-15. A frame that reviews a file

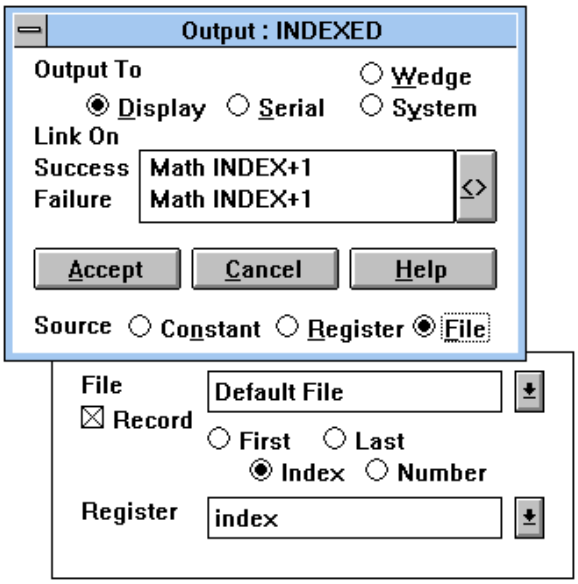


The nodes in this example work as follows:

- **Copy : END** copies the constant “end” to the end of the default file to mark the last record.
- **Copy : INDEX=1** copies the number 1 into a register named INDEX. This register will determine which record is displayed.
- **Verify : END** looks at the record at the position specified in the INDEX register. If the record contains “end”, this is the last record in the file, and the program deletes the “end” record and exits to the main frame. If it does not find “end”, the program continues to the Output node.

- **Output : INDEXED** displays the contents of the record at the position specified in the INDEX register on the portable's screen. Figure 4-16 shows the settings in the dialog box for the node.

Figure 4-16. The Output : INDEXED dialog box



- **Math : INDEX+1** increments the value in the INDEX register by 1 so that the next record in the file will be displayed.
- **Input : NEXT** keeps the record contents displayed until the user presses a key. The program then loops back to **Verify : END** so that the next record can be displayed.

The loop continues until the "end" record is reached, at which point the program deletes the "end" record and exits the frame.

The file is displayed one record at a time on the screen. Each time the user presses a key, the next record is displayed on the last line, and the previous line moves up. The user can scroll the screen up to see previous entries in the file.

A variation of this example gives the user the ability to search through records in both directions: First, find the end of the file (see "Finding the Number of Records in a File," on page 109). Next, output the first record and give the option to see the next or the previous record. Then, increment or decrement the counter and verify that the range is between 1 and the end-of-the-file value.

Sounding a Beep

To sound a beep on a portable, use an Output node with the **Source** option set to **Constant** and **Destination** set to **System**. In the input box for the constant, enter one of the following codes:

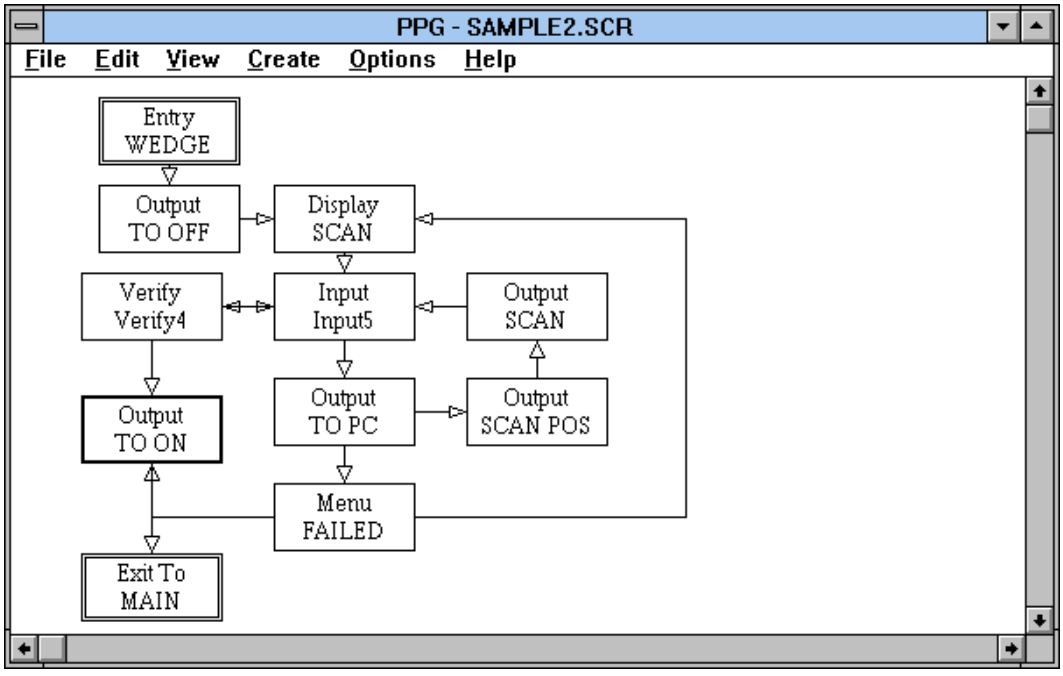
.+ (sounds a high beep)
.- (sounds a low beep)

You can enter more than one code, for multiple tones. For example, **.+.-.+** sounds a high beep followed by a low beep followed by another high beep.

Converting the PT 2000 into a Wedge

To use the PT 2000 as a wedge between a computer and its keyboard, connect the PT 2000 to the cable (part number 00-884-20). Then connect the other end of the cable to the wedge cable (part number 00-001-00 or 00-061-00), set up between the keyboard and the computer. Use a program frame similar to that shown in figure 4-17 to display scanned data both on the PT 2000 and on the computer screen.

Figure 4-17. A frame that outputs data to a PC screen



The nodes in this example work as follows:

- **Output : TO OFF** sets the automatic timeout setting to 99 minutes. This keeps the PT 2000 from turning off after 10 minutes.

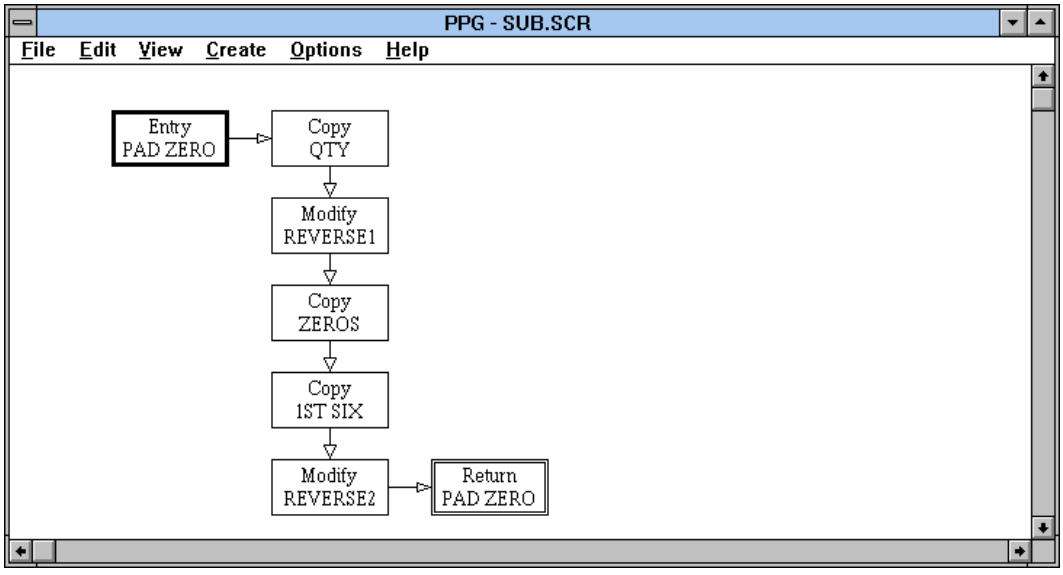
- **Display : SCAN** prompts the user to scan a bar code or press **F4** to exit.
- **Input : DATA** accepts scanned data and stores it in the default register.
- **Verify : EXIT** checks to see whether the user pressed **F4**. If so, **Output : TO ON** resets the automatic timeout setting before the program returns to the Frames level.
- **Output : TO PC** displays the scanned data (stored in the default register) on the connected PC screen. If output fails, **Menu : FAILED** announces this, and the program exits to the Frames level.
- **Output : SCAN POS** positions the cursor on the PT 2000 screen, and **Output : SCAN** displays the scanned data at the cursor.

The PT 2000 can be powered and charged from the keyboard.

Padding a Number with Leading Zeros

Many database programs use *fixed-length fields,* which means that values stored in them must be a given number of characters long. Values with fewer than the required characters can be “padded” with zeros at the beginning; the value 12, for example, would appear as 0012. The program frame shown in figure 4-18 uses a combination of Modify nodes, Copy nodes, and two templates to pad a number with leading zeros.

Figure 4-18. A frame that pads a number with leading zeros



The nodes in this example work as follows:

- **Copy : QTY** copies the quantity value in the default register into the INPUT SIZE register.

- **Modify : REVERSE1** reverses the order of digits in the INPUT SIZE register.
- **Copy : ZEROS** copies six zeros to the end of the value in the INPUT SIZE register.
- **Copy : 1ST SIX** copies the first six digits in the INPUT SIZE register back into the **Quantity** field of the default register. Any zeros beyond the sixth digit are dropped.
- **Modify : REVERSE2** reverses the six characters in the default register, returning the original input to the correct order with leading zeros.

This technique can be used with any fixed length by simply changing the fixed length of the second template and providing enough zeros in the Copy node.

Appendix A
Error Messages

This appendix lists error messages that you might come across in the Percon Program Generator. Following each error message is a possible solution and, where applicable, a reference to the section of this manual in which you can find more information about solving the problem. If you continue to have trouble with your program, you can call Percon for technical assistance (see “Technical Support,” on page 4).

Column must be between 0-15.

You entered an invalid column number in the Input Echo subdialog box of the Input node dialog box. You must specify a column position from 0 to 15.

See “Echoing Input,” on page 62.

Double quote.

You specified a register, file, or field name that contains one or more double quotation marks (**"**), which are not acceptable. Enter the name again without the quotation marks.

Empty string.

You selected **Accept** in a dialog box without specifying a required register, file, or field name. Return to the dialog box and fill in any empty input boxes.

No more than 8 sections in link.

You created a link that had more than the limit of eight sections or seven joints. You need to modify the link.

See “Creating and Using Links,” beginning on page 56.

Row must be between 0-3.

You entered in invalid row number in the Input Echo subdialog box of the Input Node dialog box. You must specify a row number from 0 to 3.

See “Echoing Input,” on page 62.

Syntax error.

PPG generated source code that is not recognizable by the portable. Under normal circumstances, this message should never appear. If you encounter it, however, save your file and send it to Percon for debugging.

Timeout exceeded.

When downloading a program or data file into the portable, PPG did not receive acknowledgment from the portable within a specified number of seconds. Make sure the portable is securely connected to the PC and that the appropriate COM port is selected. Try resetting the portable (eject and replace the battery while pressing **Shift+Enter**). You may need to prepare the portable for downloading first by scanning the following code:

See "If You Have Problems," on page 93.

Undefined link.

A node in your program flow chart is missing a required link. This error occurs most often for Verify, Math, and Output nodes. These nodes require two links, even if both go to the same node. Check all nodes of these types and make sure that both settings for **Link On** list nodes. If either the **Success** or **Failure** option is set to None, you need to create a second link, even if it duplicates the first.

See "Creating and Using Links," beginning on page 56; "Verify Nodes," beginning on page 67; "Math Nodes," beginning on page 63; "Output Nodes," beginning on page 66; and the tip on page 25.

Appendix B
Warranty Information

For a period of up to 90 days from the date of shipment from Percon, Percon warrants the magnetic disk on which the Percon Program Generator is stored to be free from defects in materials and faulty workmanship. If you encounter a defect on the disk within this period, call the Percon Technical Support group at 503-344-1189 for instructions and a Return Authorization number for returning the disk to Percon. Percon will replace the faulty disk at no extra charge. After the 90-day warranty period, there is a nominal charge for disk replacement.

No other express warranty is given. The replacement of a product is your exclusive remedy. Any other implied warranty of merchantability or fitness is limited to the duration of this written warranty. Some states, provinces, or countries don't allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

In no event shall Percon be liable for consequential damages. Some states, provinces, or countries do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights that vary from state to state, province to province, or country to country.

Products are sold on the basis of specifications applicable at the time of manufacture. Percon shall have no obligation to modify or update products once sold.

Appendix C
ASCII Table

Hex	ASCII	Hex	ASCII	Hex	ASCII	Hex	ASCII
00	NUL	20	SP	40	@	60	`
01	SOH	21	!	41	A	61	a
02	STX	22	"	42	B	62	b
03	ETX	23	#	43	C	63	c
04	EOT	24	$	44	D	64	d
05	ENQ	25	%	45	E	65	e
06	ACK	26	&	46	F	66	f
07	Bell	27	'	47	G	67	g
08	BS	28	(	48	H	68	h
09	TAB	29	)	49	I	69	i
0A	LF	2A	*	4A	J	6A	j
0B	VT	2B	+	4B	K	6B	k
0C	FF	2C	,	4C	L	6C	l
0D	CR	2D	-	4D	M	6D	m
0E	SO	2E	.	4E	N	6E	n
0F	SI	2F	/	4F	O	6F	o
10	DLE	30	0	50	P	70	p
11	DC1	31	1	51	Q	71	q
12	DC2	32	2	52	R	72	r
13	DC3	33	3	53	S	73	s
14	DC4	34	4	54	T	74	t
15	NAK	35	5	55	U	75	u
16	SYN	36	6	56	V	76	v
17	ETB	37	7	57	W	77	w
18	CAN	38	8	58	X	78	x
19	EM	39	9	59	Y	79	y
1A	SUB	3A	:	5A	Z	7A	z
1B	ESC	3B	;	5B	[	7B	{
1C	FS	3C	<	5C	\	7C	|
1D	GS	3D	=	5D	]	7D	}
1E	RS	3E	>	5E	^	7E	~
1F	US	3F	?	5F	_	7F	DEL

Appendix D
The PPG Library

Percon offers a library of several sample PPG program source files. This library, which is available from your PPG dealer (ask for part number 00-734-20), provides samples of file manipulation, templates, and nodes. Several working programs are included, although many of them are only examples and do not provide any functional value. This appendix briefly describes each file.

ASHOST.SCR

A data-collection program that allows a remote system to call up the portable via modem and receive the data.

AUTO.BAT

A batch file that uses the SAMPLE2.SCR program and automatically pulls files from the collect mode.

BASIC.SCR

A program with options for Menu, Upload, and Erase nodes completed. The Collect node is left empty for the user to set up.

CASHREG.SCR

A program that does all the basic things a cash register would do, including figure totals with taxes, figure change, and print a receipt.

CLOCK.SCR

A program that displays time and date. Formats are selectable, and an alarm capability is available.

COLLECT.SCR

The collect portion of the sample program that comes with each portable.

COLLTIME.SCR

A program that stamps all item entries with the date and time. Output format is *date,time,item*.

COMPILE.SCR

A collect-only program that counts the number of duplicate entries in a file. Output format is *item,repeats*.

CONFIG.SCR

A program that allows the user to scroll through and change system parameters from a list that is loaded into the portable.

FIELDS.SCR

A short program that demonstrates template use by combining two inputs with a comma delimiter.

FIELDS1.SCR

A template example where the first two characters are stripped out of the register.

HANGMAN.SCR

A program that uses the classic word game as an excellent example of complex file manipulation. A word of up to nine characters is entered by a user. A second user then guesses the word. Each correct guess is filled into the appropriate blank, and each incorrect guess is displayed on the screen as “Hangman” is spelled out.

HOSPITAL.SCR

A program designed to help nurses track patient medications and used items. It also has a reminder feature and a way to review each patient’s file.

INSPECT.SCR

A program that prompts the user with questions about a scanned item and records a pass or fail condition with comments.

ITQU.SCR

The other portion of the standard sample program that comes with each portable. Item and quantity collection are featured.

LIBRARY.SCR

An application to track checked in, checked out, and late books in a school library.

MATH.SCR

An example of the math node. The register is multiplied by 3.

METO5000.SCR

An example of running a serial printer with the portable.

MODEM.SCR

A complete example of a modem communications program designed to transmit and receive files.

MODIFY.SCR

An example of the Modify node that options for all modify functions.

MONEY.SCR

A program that keeps a running total on an item. A pick list file is downloaded into the portable, and as the items are matched, the user has the option to add or subtract a quantity from the total.

MULTIPLE.SCR

A multiple-option program that includes a Collect node with a compile option; an item/quantity option; a pick list; a calculator; and a clock option.

MULTPLE2.SCR

A large program (342 nodes, with 8 separate programs) that has the same options as MULTIPLE.SCR plus a modem communications program, the hangman game, and a time tracker.

PICKLIST.SCR

A program in which, as items are matched, they are erased from a downloaded pick list and moved to another file for uploading.

RANGE.SCR

A sample of a range test, in which high and low numbers are entered and followed by a test number. In or out of range is then displayed.

TRACKER.SCR

A sample of a minutes counter. A pick list is downloaded, and when a function is chosen, time (in minutes) is counted until the function key is selected. Total time is accumulated for each function.

TRACKER2.SCR

A sample of a different approach to tracking time. As each function is scanned or typed in, the time is reset to zero. The clock updates every second, and the total time is then copied to the file in regular clock format.

UPLOAD.SCR

A sample data-collection program that transmits data via a modem using Procomm Plus in host mode.

UPPRPLUS.SCR

A sample data-collection program that transmits data to a host via a modem using Procomm Plus in host mode.

Appendix E
Useful Bar Codes

Reset Factory Defaults

File Dump

Program Mode

Set Date

Set Time

<CR> Only Protocol

ACK/NAK Protocol

Xmodem Protocol

Glossary

This section contains definitions for important terms used in this manual. You should be familiar with these terms before attempting to use Percon Program Generator (PPG) to create your own programs. *Italicized* words in definitions are defined in this glossary.

breakpoint

If there are certain areas of your program that you want to focus in on when using the *emulator*, you can set a breakpoint at one or more *nodes*. When you execute the program (with the **Run** command), the *emulator* will stop execution wherever there is a breakpoint. You can then use **Run** or **Step** to resume execution.

Call node

A Call node executes a branch to a *subroutine*.

columns

The display screen of your Percon portable is divided vertically into sixteen columns, numbered 0 through 15.

Copy node

A Copy node is used to transfer information from one *file* or *register* to another *file* or *register*.

data collection

Data collection is the process of gathering information by scanning bar codes or using data keys to enter values into a portable.

Display node

A Display node is used to define messages to appear on a portable's screen.

DOS

DOS is the **D**isk **O**perating **S**ystem used by the PC. It is the foundation on which Windows and other programs are run.

emulator

The emulator is a utility that models a portable for the testing of program flow charts.

field

A field is a place in a *register* for the entry of or access to a specified type of data. Fields and their locations in a *register* are defined by *templates*.

file

A file is a storage location for data. Flow charts you create in PPG are stored in files on your PC. Portables use a different type of file for storing collected or downloaded data (see *portable file)*.

frames

Frames are the *objects* you use to create the general flow chart of your data-collection tasks. Each frame in a program flow chart represents a major function or option. Typically, a program's frames include a **Main Menu** frame and a frame for each option on the menu. *Links* connect the frame in a way that indicates program flow.

Frames level

The Frames level of a program flow chart shows the main functions of the program. Details of each function are given in a *Nodes level* for each *frame*.

index

An index is a number used to access a single *record* in a *file*.

input

Input is the information gathered during *data collection* or the action of gathering the information.

Input node

An Input node designates what type of portable *input* is acceptable and where the *input* will be stored.

jointed link

A jointed link is a *link* that has two or more segments intersecting at right angles.

link

A link connects two *frames* or *nodes* with an arrow directing the program to the next step. A link pointing to a *frame* or *node* shows how it is accessed. A link pointing away from a *frame* or *node* shows where the program goes next.

Math node

A Math node performs mathematical operations on given data.

Menu node

A Menu node presents a menu of options on the portable's screen and specifies what actions will occur when the user presses function keys associated with those options.

Modify node

A Modify node changes given data.

node

A node is a box in the *Nodes level* of a program flow chart that represents one step in the program. There are different types of nodes for each kind of action that can be performed by the program. Detailed instructions for the action are specified by settings in a dialog box associated with the node. A connected set of nodes makes up one *frame* of a program flow chart.

Nodes level

The Nodes level gives step-by-step details for a particular *frame* of a program flow chart. The details are given in various types of *nodes*. Each *frame* of a flow chart has its own set of *nodes* at the Nodes level.

object

An object is the generic term for a *frame*, *node*, or *link*.

Output node

An Output node is used to transfer data to a portable's display or to the host computer.

portable file

Data that has been either *input* via a portable's wand or data keys or downloaded from a PC *file* through the serial port is saved in a portable file. Each entry in the portable file is called a *record*, and the *records* in each portable file are numbered, starting with 1 for the first *record*.

program source file

Program flow charts created with PPG are stored in *DOS* data *files* called program source files. A program source file must be compiled (using PPG) before it can be loaded into a portable.

record

A record is a set of related data *fields* stored as a single line in a *file*.

register

A register is a temporary holding place for up to 128 characters of data. When you scan a bar code with a portable, the code is stored in a register until it is verified and copied into a *file* for safekeeping. The contents of the register are overwritten each time you scan a code.

rows

The display screen of your Percon portable is divided horizontally into four rows, numbered 0 through 3.

subroutine

A subroutine contains *nodes* that execute program steps, very much like a *frame*. The difference is that a subroutine sits off to the side of a flow chart instead of being connected to other *objects*. It contains functions that can be referenced within any of the program's *frames* with a *Call node*.

template

A template is a structure that you can define and impose on data. It lets you alter the way in which collected data is stored. The most common use of a template is to take data from two or more *registers* and tie them together in a single *register*.

Verify node

A Verify node checks data against specified requirements.

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